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Evaluation of an Alphanumeric Target as a Means of Determining the "Resolution" of a Photographic Reconnaissance System

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ABSTRACT

This experiment relates three forms of resolution as predictors of recognition and identification of objects that could be of interest in a military photo-reconnaissance situation. Of the three forms of resolution, two are based on existing types of resolution target currently used for assessment purposes and the third, being evaluated under this experiment, is based on a Block Letter (alphanumeric) target. The results and conclusions of this experiment will show that at a confidence of 90%, the Block Letter target provides a significantly better resolution value for the prediction of recognition and identification of the type of objects used in this experiment.

EVALUATION OF AN ALPHANUMERIC TARGET AS A MEANS OF DETERMINING THE "RESOLUTION" OF A PHOTO-RECONNAISSANCE SYSTEM

INTRODUCTION

1. The commonest parameter, indeed often the only quantitative parameter, used to evaluate a photo-optical system, is resolution. In reconnaissance, the quantity of interest to the photo-interpreter is that of information content, often expressed in terms of size of object detectable, recognizable or identifiable.[36] Thus, it is reasonable to consider the resolution value as a measurement or predictor of the size of object that might be recognized or identified at any given scale.

2. The most frequently encountered types of resolution target and the types of concern in this paper, are the U.S. Air Force tri-bar target (called "USAF target" for the remainder of this paper) and the National Research Council (Canada) annulus target as devised by L.E. Howlett[13] (called "annulus target" for the remainder of this paper). Both of these targets consist of simple geometric forms presented in a geometrically decreasing order of size. Both targets, as normally presented, are, to a certain degree, of a periodic form and hence exhibit some of the optical phenomena associated with periodic targets. Because the nature of each target element, for both the USAF and annulus targets, is known a priori, determination of resolution involves a scan of the decreasing sizes of target elements until the detection of the expected pattern is no longer possible.

3. Donaldson & Gough[9] have devised a set of alphanumeric block letter characters, as suggested by McCamy[21] and others,[2, 6] of virtually equal visual recoginability. If such block letters were presented in a random array, both in terms of character type and size, then use of such an array as a means of determining resolution would involve identification of individual characters with no a priori knowledge of the character type, little or no periodicity to the characters, and no judgement of the resolution value until after the complete array were scored. It is proposed, then, that the size of an alphanumeric block letter target element

may relate better than the size of an annulus or USAF target element to the size of objects required to be recognized or identified, at threshold conditions, in a military photo-reconnaissance system.

OBJECTIVES

4. The response variable in each case will be a reciprocal dimension of target or object image just recognized or identified. This reciprocal dimension will be measured in mm^{-1} and is given by:

$$\frac{H \times 12}{F \times d}$$

H = object distance (ft)
F = focal length of lens (in.)
d = a physical dimension, in mm, of the target or object

Because we are investigating resolution targets as predictors of object size recognized at threshold, Y will be object response (Models, etc. image in mm^{-1}) and X will be target response (resolution). Note that the response variables can be caused to change by a number of different factors; however, the factors chosen are ones representative of condition changes found in practice[4, 14] and in each case are limited to those which will produce a uniform non directional change over the complete image area.

(i) Determine which mathematical model (linear or quadratic) gives the narrowest confidence limits of Y on X for each of the following types of resolution target plotted against model threshold recognition.

(a) USAF low-contrast resolution target.
(b) Annulus low-contrast resolution target.
(c) Block letter low-contrast resolution target.

(ii) From the results of (i), determine the mean confidence interval of Y over the total range of X for each case (linear & quadratic) and rank the intervals in order of size. Determine if the difference of interval is significant between the three linear cases, three quadratic cases and between the narrowest ("best") interval for each target type.

(iii) For (i) & (ii), Y response will be based on a "d" equal to the mean of the model length plus width. Is there a significant change in the confidence intervals on Y when "d" is determined by:

(a) The square root of the projected area of the model;
(b) Mean length of the model; and
(c) The square root of length times width of the model.

(iv) Repeat the above three objectives when Y is based on model threshold identification rather than recognition.

(v) Confirm the validity of using models by repeating (i) & (ii) using a Y response based on aerial photographs of real objects and determine if the ranking of confidence intervals based on aerial photography differs from that based on models.

(vi) Is there a significant difference in readings of Block Letters (in terms of lowest threshold size resolved) between trained and untrained observers.

(vii) Repeat (vi), except read models for Block Letters.

EXPERIMENTAL PROCEDURE

5. For the laboratory experiments, a Speed-Graphic camera fitted with a 70mm roll-film back and a 152mm Kodak Ektar lens was used, rigidly held in the "ASTM Standard Camera Alignment".[20] A second focal length lens was available by removing the front element of the Ektar lens, giving a degraded lens system with a calculated focal length of 96.07mm. The target array (as shown in Appendix "A") was placed in "ASTM Standard Orientation No. 1 for a Plane Surface"[20] with respect to the camera and was so designed that the distances used between camera and targets, no part of the array was more than 10 degrees off the optic axis. This target array was illuminated to give essentially uniform exposure over the entire array, as measured by a G.E. PR1 exposure meter.

6. For the reasons shown by H.A.W. McGee[22] and others[5], it was decided to restrict this investigation to low-contrast targets. The paints used produced

an average reflection density difference of 0.26, plus/minus 0.02; with the background density being 0.92, plus or minus 0.02. These gray paints were essentially neutral as measured by a MacBeth Quantalog RD-100 densitometer. The same paints were used for the construction and painting of all resolution targets and the models.

7. The USAF resolution targets were of the tri-bar type with spaces between bars equal to the bar width. Each bar was 5 times its width, hence each set of bars formed a square. The tri-bar elements were arranged in serial orders of 10mm, 9, 8, 7, 6, 5, 4, 3.5, 3, 2.5 and 2mm bar widths. Target parameter "d" was taken as twice a bar width.

8. The annulus resolution targets were of the type described by L.E. Howlett[13] and currently used by the Royal Canadian Air Force. The annuli are presented in pairs, each annulus to have an inner diameter equal to 1/3 the outer diameter, and each annulus to be separated from all other annulus by at least 1/3 of the larger annulus diameter. The annuli pairs were arranged in serial order of 49mm, 42, 36, 30.5, 24, 21, 18, 15, 12 and 9mm outer diameters. Target parameter "d" was taken as 2/3 of the outer diameter.

9. The alphanumeric characters used as a Block Letter design are shown in Appendix "B". Two changes from the Donaldson-Gough set of characters are apparent: first, the "tail" of the "9" is reversed so that there can be no rotational confusion with the "6"; second, after discussion with K.C. Donaldson, it was felt that the unequal response of the "6" could well be due to the presence of the "G" in their set, hence, it was decided to ~~include~~ the "6" ~~in~~ this set. The seven alphanumeric characters chosen were made up in each of sizes 20mm, 25, 30, 35 and 40mm to a side. For each negative made, 25 of the 35 possible size-character combinations were randomly selected and randomly displayed in a 5 x 5 matrix. Target parameter "d" was based on the length of character side as shown in para 18.

10. The models chosen as recognition and identification targets are shown in Appendix "C", together with their reference number and pertinent dimensions. Of

the 25 models, 10 were selected at random and presented in random order in two rows of five within the target array. Each model would appear only once within any given negative. The models selected were painted and presented under the same contrast conditions as used for the resolution targets. These models were considered representative of typical civilian and military vehicles that a photo-interpreter might be required to recognize or identify and, in each case, the model was considered sufficiently accurate in scale and detail so as to be representative of an actual vehicle. Note that the models were presented with a minimum of clues as to background, cast shadow (i.e., under conditions of flat lighting) and were not necessarily in scale with respect to one another.

11. In addition to the above targets, the array contained an identifying code, large patches of white, gray (dark, as per background target paint), gray (light, as per target paint) and black; and a ten step gray wedge.

12. Inasmuch as this experiment was designed to relate to the very practical problems encountered in military photo-reconnaissance, the factors chosen as variable to achieve differing resolution results are from those that might be encountered under actual conditions. Note that the change in photo-optical conditions are, in themselves, relatively unimportant except to provide a varied means of changing the resolution and, that their effects are uniform across the whole film surface of interest. One hundred and forty negatives were exposed, varying "f" stop, film type, object distance, flare exposure (produced by a secondary exposure with opal glass held over the lens), lens degradation (with accompanying change of focal length) and focus; from these negatives, 30 were chosen (as shown in Appendix "D") by the criteria of a model recognition range greater than 0% and less than 100%. The three films chosen (Improved Tri-X type 5063, Tri-X type 8403 and Panatomic-X type SO-136) were representative of medium to high speed films currently in use for photo reconnaissance.

13. All film used in this experiment was processed in Kodak Versamat "B" chemistry at times and temperatures as recommended by Kodak for these films to achieve a mean gamma of 0.75. Density readings were taken of the images of the white and black patches contained within the target array (min/max readings) and are shown in Appendix "D".

14. The chosen negatives were presented to two groups of readers, trained and untrained, in a random order, together with the scoring sheet and instructions shown in Appendix "E". All untrained readers used a twenty power binocular microscope on a light table of variable intensity. Each observer was allowed to vary the light intensity as desired, use whatever time was required and, in each case, was not required to give a forced response. Prior to starting the readings, each observer read the instruction sheet shown in Appendix "E", studied a sample negative and scoring sheet (complete with correct answers) and was provided with a card containing 2" x 2½" close-up photographs of each model with its number code and class code shown below it. The group of trained observers (Canadian Army Intelligence Corps) followed a similar technique with the exception that they had available a variety of magnifications and could choose this variable at will.

15. The aerial photography, in satisfaction of objective (v) was conducted from a CF100 aircraft mounted with five vertically oriented Vinten F-95 70mm reconnaissance cameras. Four of the cameras were fitted with Leitz (Canada Ltd) 3" lenses, the fourth with a Taylor, Taylor & Hobson 4" lens. The target area contained a large annulus resolution target array, a set of large block letter targets constructed and laid out to the same specifications as shown in para 9, and assorted natural objects of military interest in photo-reconnaissance. Flights were conducted at various altitudes over the target array with both Imp Tri-X type 5063 and Panatomic-X type SO-136. Details of the flight and photo-optical system parameters are shown in Appendix "F".

16. All raw data, with the exception of that pertaining to the aerial photography, was tabulated on IBM punch cards in numerical code. An initial analysis of the data

was made on an IBM 1620 computer to check for gross data errors and detect areas of missing data. The final analysis was conducted on an IBM 360 computer using the program shown in Appendix "G".

STATISTICAL ANALYSIS

17. Annulus and USAF resolutions were calculated by the following simple formula using the "d" values described in paras 7 and 8. The mean of all observers value for each negative was determined and used in further calculations.

$$\text{resolution} = \frac{\text{Obj Dist (ft)} \times 304.8}{\text{Foc Length (mm)} \times \text{"d"}}$$

18. In determining a "d" value for the block letter targets it was realized that although the alphanumeric characters chosen were essentially equal in terms of visual recognition, they did not necessarily have the same characteristic under a photographic operation. To eliminate any error from inherent differences in recognition, a weighting function was determined for each letter type as follows:

$$F_i = \frac{C_i \times L_t}{C_t \times L_i}$$

where F_i = weighting factor for each letter type i

$C_t = \Sigma$ all correct letter responses (all types & sizes)

$C_i = \Sigma$ all correct letter responses, type i

$L_t = \Sigma$ all letters presented, all types

$L_i = \Sigma$ all letters presented, type i

By analogy with the annulus type of target, the block letters should have "d" values of 8, 10, 12, 14 or 16. To determine the actual "d" value, a modification of a scoring technique used for finite multi-choice quizzes was devised as follows:

$$SB_j = \frac{(DA - \frac{SO}{6})}{DB}$$

SB = score for letter size j

DA = ΣF_i for letters correct of size j

SO = ΣF_i for letters wrong of size j

DB = ΣF_i for all letters presented of size j

Because there are a possible 7 responses for any one position on the matrix, "wrong" responses are penalized by a factor of 1/(7-1). This scoring technique gives a range of "1" for all correct and "0" for guessing (a ratio of 1 correct to 6 wrong). The final "d" value is determined as follows:

$$\text{"d"} = 18 - \sum_{j=1}^{5} (2.4 \times SB_j)$$

This technique thus gives a "d" value of 18 for a situation of no response or guessing in all of the block letter matrix positions, and a "d" value of 6 for a matrix of all correct responses. Note that, for this experiment, negatives that showed either perfect or "6" scores were not used.

19. In a manner similar to that used for the block letter targets, the following scoring technique was used to determine model recognition and identification:

$$R = \frac{Z1 - Z3/24}{Z1 + Z2 + Z3}$$

R = score for identification
Z1 = number of models correct
Z2 = number of models missed
Z3 = number of models wrong

$$S = \frac{Y1 - Y3/5}{Y1 + Y2 + Y3}$$

S = score for recognition
Y1 = number of models correct
Y2 = number of models missed
Y3 = number of models wrong

$$T = \frac{P1 + P2 + P3 + P4}{4 + (4 \times R)}$$

$$U = \frac{Q1 + Q2 + Q3 + Q4}{4 + (4 \times S)}$$

P = model size parameter x weighting factor (ident)
Q = model size parameter x weighting factor (recog.)
P1, P2, P3, P4 = smallest four values of P
Q1, Q2, Q3, Q4 = smallest four values of Q

$$\text{MODEL IDENTIFICATION} = \frac{\text{Obj Dist (ft)} \times 304.8 \times R}{\text{Foc Length (mm)} \times T}$$

$$\text{MODEL RECOGNITION} = \frac{\text{Obj Dist (ft)} \times 304.8 \times S}{\text{Foc Length (mm)} \times U}$$

The size parameter on which model recognition or identification is based was either model length, mean of length plus width, square root of projected area or square root of length times width.

20. From each of the negatives, an average (mean) resolution and model identification or recognition for each parameter choice and, for each negative, a mean square variation represented by:

$$\sum (X_i - X)^2$$

was calculated. A standard regression analysis technique was employed in determining both linear and quadratic lines of best fit. To avoid treating the data as a bi-variate case, the X parameter (resolution) was coded into equi-spaced cells by taking the integer part of the average resolution plus 0.5. Besides the regression coefficients for each case, the following statistics were also calculated: a calculated "F" for lack of fit; a S_{yx} term based on the square root of the residual following from the analysis of variance; an error term and degrees of freedom represented by the error term and the average value of the mean square variance previously calculated for each negative. Finally, the correlation coefficient R was calculated for each set of X, Y data by the formula:

$$R = \frac{\sum (X_i - \bar{X})(Y_i - \bar{Y})}{(\sum (X_i - \bar{X})^2 \sum (Y_i - \bar{Y})^2)^{\frac{1}{2}}}$$

RESULTS

21. A computer print out of results is shown in Appendices "H" and "I". The following notes apply to the various tables of this Appendix:

(1) Appendix "H" applies to "untrained" observers, Appendix "I" to trained observers. Each of the following notes applies to both appendices.

(2) Table 1 shows the frequency each model was called, both as a correct response and in lieu of some other model presented. The column "not

read" indicates the number of times a model was missed (marked "O" on the scoring sheet). The model numbers refer to the same numbers as appear in Appendix "C".

(3) Tables 2 and 3 are similar in nature to Table 1, except they refer to block letter response and model recognition, respectively.

(4) Table 4 is a frequency chart of letter, models identified and models recognized; in terms of number presented, number correct and number missed (marked "O"). The term "weight" is equivalent to F_i of para 18.

(5) Table 5 shows individual reader's response to each of the target types on each negative. To the right is shown the average response, a coded response based on the integer part of the average response plus 0.5, and the variation among readers for each negative.

IDN 1, REC 1 are based on model size parameter of length

IDN 2, REC 2 are based on model size parameter of sq rt proj area

IDN 3, REC 3 are based on model size parameter of (L plus W)/2

IDN 4, REC 4 are based on model size parameter of $(L \times W)^{\frac{1}{2}}$

(6) Table 6 the regression analysis results for both the linear case and quadratic (CURVE) case. The other columns refer to the statistics described in para 20. Note that each grouping is referred to by a four digit code. This code will be used throughout these results and discussion of results and is read as follows:

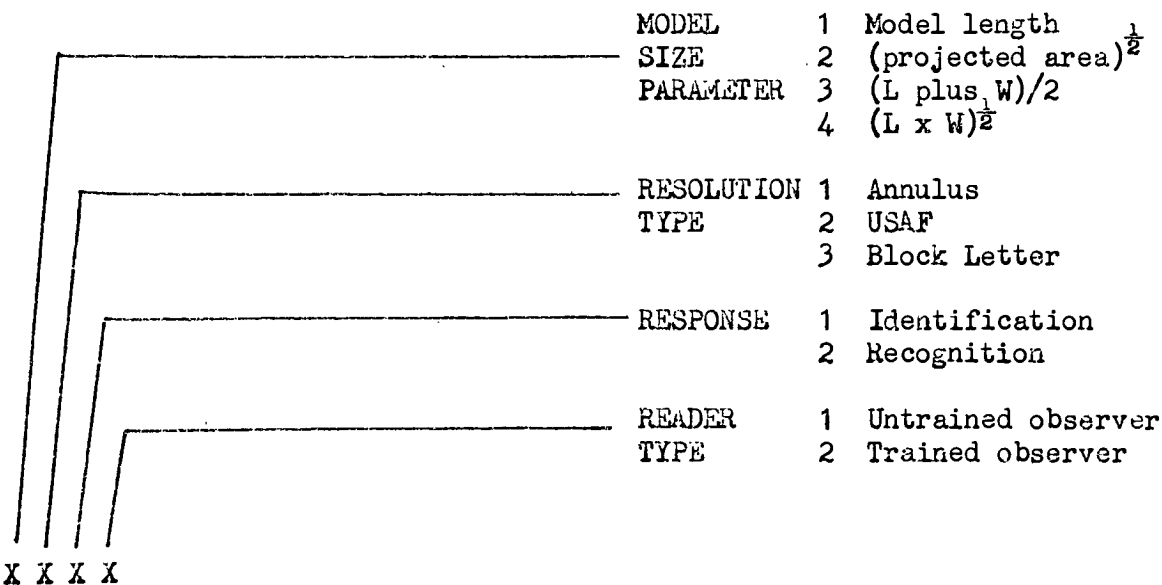


TABLE 1

'R' and Syx values according to rank

code no.	R value		Avg Y	Syx (curve)		Syx (line)		Syx(curve) Avg Y		Syx(curve) Median Y	
4322	).7705	1	4.5232	1.586	23	1.618	23	0.3506	2	0.3429	1
3322	.7681	2	4.1227	1.430	21	1.465	22	.3469	1	.3548	3
2322	.7666	3	4.4723	1.593	24	1.623	24	.3562	4	.3459	2
1322	.7501	4	3.0308	1.078	3	1.109	4	.3557	3	.3704	7
3321	0.7120	5	4.4664	1.755	28	1.752	28	0.3929	5	0.3675	5
2321	.7061	6	4.8971	1.980	37	1.977	37	.4043	11	.3687	6
4321	.7011	7	4.8848	1.996	39	1.992	38	.4086	13	.3738	8
1321	.6993	8	3.3312	1.323	13	1.325	14	.3972	7	.3670	4
3221	0.6912	9	4.4664	1.820	32	1.803	30	0.4075	12	0.3812	10
2221	.6858	10	4.8971	2.053	41	2.032	41	.4192	18	.3823	11
4222	.6840	11	4.5232	1.805	30	1.852	33	.3991	9	.3903	14
3222	.6821	12	4.1227	1.624	25	1.673	25	.3939	6	.4030	17
4221	0.6814	13	4.8849	2.065	44	2.045	43	0.4227	20	0.3867	12
2222	.6807	14	4.4723	1.806	31	1.851	32	.4033	10	.3922	15
1221	.6797	15	3.3312	1.369	19	1.360	16	.4110	15	.3798	9
1222	.6672	16	3.0308	1.204	7	1.249	7	.3973	8	.4137	23
3122	0.6618	17	4.1227	1.693	26	1.715	26	0.4107	14	0.4201	25
4122	.6604	18	4.5232	1.885	34	1.906	34	.4167	16	.4076	19
1311	.6580	19	2.4265	1.299	12	1.301	12	.5353	32	.4170	24
3311	.6576	20	3.1368	1.745	27	1.734	27	.5563	36	.4363	28
2122	o.6566	21	4.4723	1.888	35	1.906	35	0.4222	19	0.4100	21
2311	.6439	22	3.4334	2.014	39	2.000	39	.5866	42	.4441	30
1122	.6437	23	3.0308	1.263	11	1.284	10	.4167	17	.4340	27
1211	.6429	24	2.4265	1.326	15	1.324	13	.5465	33	.4257	26
4311	0.6402	25	3.4677	2.023	40	2.010	40	0.5834	41	0.4441	31
3211	.6375	26	3.1368	1.786	29	1.773	29	.5694	40	.4465	33
3121	.6273	27	4.4664	1.935	36	1.943	36	.4332	21	.4052	18
2211	.6252	28	3.4334	2.056	42	2.040	42	.5908	46	.4534	35
4211	0.6220	29	3.4677	2.064	43	2.049	44	0.5952	45	0.4531	34
2121	.6169	30	4.8971	2.189	47	2.197	47	.4470	24	.4076	20
1121	.6162	31	3.3312	1.450	22	1.460	21	.4353	22	.4022	16
4121	.6120	32	4.8848	2.201	48	2.209	48	.4506	25	.4122	22
1312	0.6060	33	2.0080	0.884	1	0.928	1	0.4402	23	0.3886	13
3111	.5963	34	3.1368	1.853	33	1.847	31	.5907	43	.4633	36
1111	.5960	35	2.4265	1.381	20	1.387	18	.5691	39	.4433	32
2111	.5783	36	3.4334	2.140	45	2.133	46	.6233	48	.4719	39

TABLE 1 (cont.)

4111	0.5766	37	3.4677	2.144	46	2.157	45	0.6183	47	0.4707	38
3312	.5577	38	2.3276	1.120	4	1.155	5	.4812	26	.4638	37
2312	.5442	39	2.3716	1.198	6	1.229	6	.5051	29	.4920	41
4312	.5397	40	2.4596	1.226	8	1.259	8	.4985	28	.4884	40
1212	0.4392	41	2.0080	1.193	5	1.048	2	0.5941	44	0.5244	44
1112	.4302	42	2.0080	0.995	2	1.053	3	.4955	27	.4374	29
3112	.3889	43	2.3276	1.245	10	1.212	9	.5749	31	.5155	43
3212	.3821	44	2.3276	1.244	9	1.186	11	.5345	30	.5151	42
2112	0.3782	45	2.3716	1.326	16	1.356	15	0.5591	38	0.5446	48
4112	.3724	46	2.4596	1.356	17	1.388	19	.5513	34	.5402	45
2212	.3676	47	2.3716	1.325	14	1.362	17	.5587	37	.5441	47
4212	.3633	48	2.4596	1.356	18	1.394	20	.5513	35	.5402	46

Table 2

Average 'R' and Sym/Avg Y values, by groups of four

	RECOGNITION				IDENTIFICATION			
	trained		untrained		trained		untrained	
				(avg 'R' values)				
Block Letter Target	4322 3322 2322 1322	.7635	3321 2321 4321 1321	.7046	1312 3312 2312 4312	.5614	1311 3311 2311 4311	.6500
USAF Target	4222 3222 2222 1222	.6785	3221 2221 4221 1221	.6845	1212 3212 2212 4212	.3856	1211 3211 2211 4211	.6317
Annulus Target	3122 4122 2122 1122	.6556	3121 2121 1121 4121	.6131	1112 3112 2112 4112	.3950	3111 1111 2111 4111	.5371
				(avg Sym/Avg Y values)				
Block Letter Target	3322 4322 1322 2322	.3524	3321 1321 2321 4321	.4008	1312 3312 4312 2312	.4813	1311 3311 2311 4311	.5454
USAF Target	3222 1222 4222 2222	.3909	3221 1221 2221 4221	.4151	1312 4212 2212 1212	.5597	1211 3211 4211 2211	.5775
Annulus Target	3122 4122 1122 2122	.4166	3121 1121 2121 4121	.4415	1112 3112 4112 2112	.5552	1111 3111 4111 2111	.6004

22. Tables 1 and 2 show the main results of interest to this experiment. In Table 1, the results are listed in order of decreasing correlation coefficient. With 30 data points, the degrees of freedom for correlation are 28 and hence, at 90% confidence (alpha equal to 0.10) all correlations above the value of 0.3070 are significant, in other words, we have found a significant correlation for each X, Y test shown in the table. Because the range of X values does not vary significantly, we can consider the confidence interval on Y at the point $X_o = \bar{X}$ in each case. Under this condition, the expression for the confidence interval on Y reduces to:

$$\hat{Y} \text{ plus, minus } t_{n-2,\ a/2}\, S_{yx}(1/n)^{\frac{1}{2}}$$

For each of the 48 cases, n equals 30, hence the whole expression reduces to:

$$\hat{Y} \text{ plus, minus } K \times S_{yx} \qquad \text{where K is a constant.}$$

Thus, it is reasonable to consider intercomparing values of S_{yx}. Further, because we are assessing X as a predictor of Y and different ranges and average Y values are encountered in the different cases, we can divide the term S_{yx} by avg Y for each case to allow for a comparison between cases of different Y values.

23. Table 2 shows the coded results grouped, with the average "R" value or average S_{yx}/avg Y values beside each group. Note that there is relatively little difference due to differences in model size parameters. From these groups, the standard deviation about each mean was computed, as shown in Table 3. Using the averages and Standard Deviations of Table 3, a confidence interval could be placed on each difference of means and a decision made as to whether the difference was significant. In each case, n equaled 4, an alpha risk of 0.10 was accepted and the following test statistic used:

$$(\bar{X}_1 - \bar{X}_2) \text{ plus, minus } (t_{2n-2,\ a/2}) \times ((s_1^2 + s_2^2)/n)^{\frac{1}{2}}$$

If the interval thus calculated contained "0", then there is no significant difference at a confidence of 90%. Note, that in calculating the above functions, truncations were done so as to increase the confidence interval. The results are shown in Table 4.

TABLE 3

Group (last three digits of code no.)	'R' Avg	'R' (Std Dev)^2	'R' Std Dev	Sym(curve)/Avg Y Avg	Sym(curve)/Avg Y (Std Dev)^2	Sym(curve)/Avg Y Std Dev
322	.7636	.0002	.014	.3524	.0001	.010
321	.7046	.0001	.010	.4008	.0001	.010
312	.5614	.0007	.026	.4813	.0008	.028
311	.6500	.0001	.010	.5454	.0011	.033
222	.6785	.0002	.014	.3989	.0001	.010
221	.6845	.0001	.010	.4151	.0001	.010
212	.5597	.0012	.034	.5597	.0006	.024
211	.6317	.0001	.010	.5775	.0006	.024
122	.6556	.0001	.010	.4166	.0001	.010
121	.6131	.0001	.010	.4415	.0001	.010
112	.3950	.0007	.026	.5352	.0008	.028
111	.5371	.0001	.010	.6004	.0006	.024

TABLE 4

Groups	'R' $(\bar{X}_1-\bar{X}_2)$	'R' $((s_1^2+s_2^2)/n)^{\frac{1}{2}}$	'R' ± interval	'R' sig	Sym(curve)/Avg Y $(\bar{Y}_1-\bar{Y}_2)$	Sym(curve)/Avg Y $((s_1^2+s_2^2)/n)^{\frac{1}{2}}$	Sym(curve)/Avg Y ± interval	Sym(curve)/Avg Y sig
322-222	.0851	.010	.0245	***	.0465	.007	.0171	***
222-122	.0229	.008	.0196	*	.0177	.007	.0171	*
312-212	.0758	.022	.0538	**	.0784	.021	.0514	**
212-112	.0994	.022	.0538		.0245	.018	.0440	
321-221	.0201	.007	.0171	*	.0143	.007	.0171	
221-121	.0714	.007	.0171	***	.0264	.007	.0171	**
311-211	.0183	.007	.0171	*	.0321	.020	.0489	
211-111	.0446	.007	.0171	***	.0239	.017	.0416	
322-321	.0590	.008	.0196	***	.0484	.007	.0171	***
222-221	.0060	.008	.0196		.0162	.007	.0171	
122-121	.0425	.007	.0171	***	.0249	.007	.0171	**
312-311	.0886	.014	.0343	***	.0641	.022	.0538	*
212-211	.2461	.018	.0440	***	.0178	.017	.0416	
112-111	.1921	.014	.0343	***	.0652	.019	.0465	**
312-112	.0667	.019	.0465	**	.0539	.020	.0489	*

Note: * indicates significant difference at 90% confidence
** " " " 95% "
*** " " " 99% "

FIGURE 1

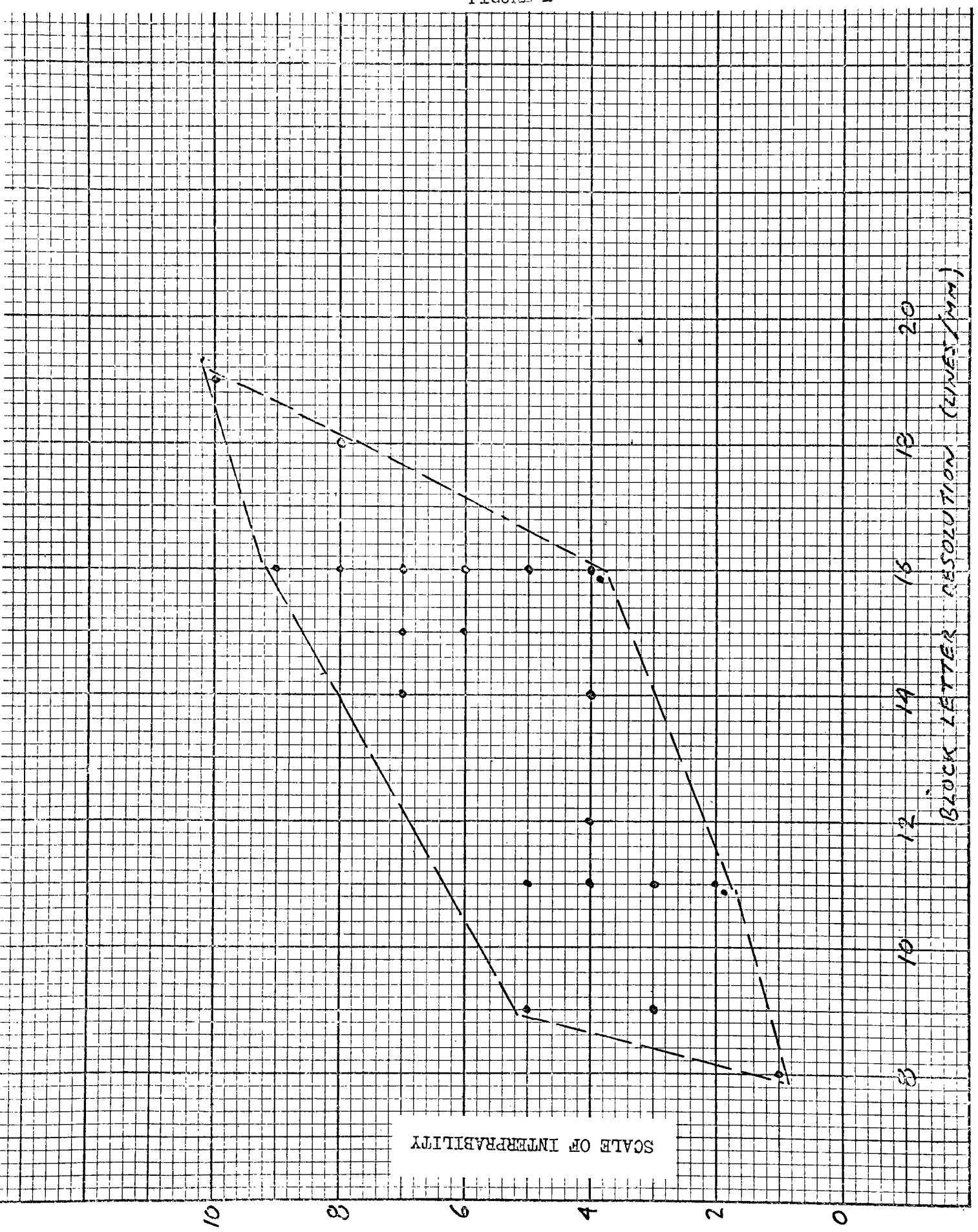
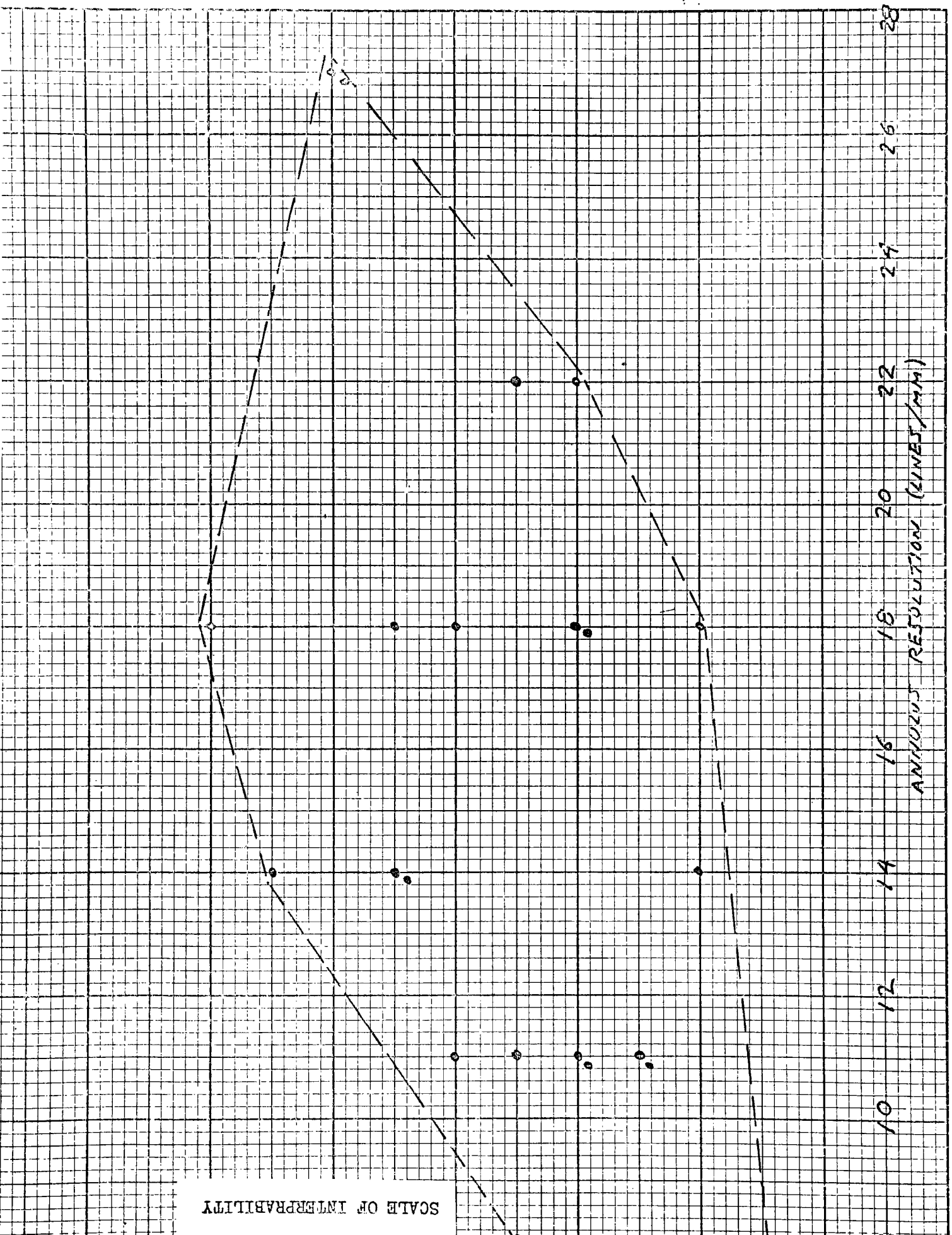

BLOCK LETTER RESOLUTION (LINES/mm)
8
10
12
14
16
20
0
2
4
6
8
10
SCALE OF INTERPRABILITY
HUGHES OWENS 315 03 10 x 10

FIGURE 2


ANNUAL RESOLUTION (LINES/MM)
10
12
14
16
18
20
22
24
26
28
SCALE OF INTERPRABILITY

24. Figures 1 and 2 show plots of resolution versus interprability for aerial negatives. Because the Y response is neither recognition nor identification but rather a complex function qualitatively called "interprability" (the criteria used was relative information content), it was not considered justified in making a quantitative statistical comparison between this data and that obtained from the controlled laboratory experiments.

DISCUSSION OF RESULTS

25. The majority of the results are self-explanatory; however, a few points should be noted. From Table 4, both Appendices "H" and "I", it will be noted that the trained observers have quite a significantly higher percentage of misses and a correspondingly lower percentage of "wrongs", for both letters and models; this would appear to be indicative of a lower level of "guessing" among trained observers. The weighting factors for the block letters indicate essentially uniform recognizability and, in fact, the weighting factors could probably be dispensed with for future similar investigations using this set of block letters. The weighting factors for model recognition would tend to show no inherent difference in recognizability between the different classes specified; the weighting factors for model identification are predictably quite varied. It is suspected that these weighting factors would be more accurate if they were determined from models with equivalent outside dimensions (say, equal means of length plus width).

26. The variations between readers is quite significantly less for the block letter target than for either the annulus or USAF target. This is reasonable if one considers that the random presentation of the block letter target precludes bias on the part of the reader, and secondly, with the population of readers used, there is no difficulty in describing or knowing a priori what a particular letter is, while there is some problem in determining what is meant by the term "resolved" as applied to either the annulus or USAF type of target.

27. The validity of all the lab tests rests upon the fact that each type of resolution target was treated alike, thus, while intercomparisons between the various lab tests is meaningful, there is little point in intercomparing the lab tests with the

results from the aerial photography. Examination of Figures 1 and 2, however, would show general agreement with the results of the lab tests.

28. It is important to remember that these trials were conducted for the limited case of recognition and identification of vehicles only, without reference to other image-area clues, such as tire marks or tread marks, relative size compared to roadbed or trees, etc. It would be interesting and worthwhile to quantize (probably by an empirical means similar to that used in this experiment) the parameter "total information content from a complex scene" in terms of a size. Perhaps this could lead to a fairly useful empirical formula of "image quality" similar to that devised by G.C. Higgins & R.N. Wolfe[12] for picture definition. Further, it would appear from the results of the experiments reported in this paper that there is some definite merit in using a target system of random but well known symbols; quite possibly the block letter targets used in this experiment could be improved by consideration of curvilinear or abstract shapes, as long as an unambiguous "label" can be applied to each shape. In connection with this type of target, this experiment would probably have been improved, certainly the scoring would be simpler, if the size of elements were changed systematically between rows while retaining the random selection of element types.

CONCLUSIONS

29. With reference to the stated objectives of this experiment, the following conclusions can be drawn:

(i) There would appear to be little or no difference between use of a linear or quadratic formula for prediction of recognition or identification from resolution, regardless of what type of resolution target is used. From the very small value of the quadratic term, it is probable that the relationship is basically linear.

(ii) In every instance, there is a very significantly better correlation (and narrower confidence interval of Y on X) for "recognition" than for identification. This would tend to show that the reading

of all three types of resolution target used is basically one of "recognition".

(iii) For both recognition and identification, there is a significantly better correlation (smaller confidence interval of Y on X) for the Block Letter resolution than for either the Annulus or USAF resolution. USAF resolution would appear to be slightly better in terms of correlation than the Annulus, although this is only significant in some of the cases.

(iv) There is no significant difference between any of the size parameters used for model recognition or identification although, from examining the data, the mean of the model length plus width would appear to give the best (narrowest) confidence interval on Y.

(v) The data from the aerial photography cannot quantitatively be compared to the laboratory data; however, the results shown in Figures 1 and 2 would tend to confirm the conclusions above, at least with respect to Annulus resolution versus Block Letter resolution.

(vi) The difference in response between trained and untrained observers is not significant in every case; however, it would appear that in each case, the trained observers showed better correlation and narrower confidence intervals on Y for the cases of recognition. For identification, the trained observers generally showed better confidence intervals but poorer correlation. Note that some or all of these differences may have been due to different reading conditions rather than a factor of training.

30. The errors in technique found within this experiment are quite apparent and, where they might bear on the results, have been pointed out and discussed. It is quite obvious that the empirical approach to a "better" means of determining resolution as a predictor for information content of interest to military reconnaissance is and can be quite fruitful. It is hoped that these tests and

the conclusions drawn from the same will be a useful starting point for further work in this same field. It became quite apparent during this experiment that to work further or deeper along this same line of investigation, it would become very necessary to create common terms or to link quantitatively terms used in the fields of photographic interpretation, photography, optics and the psychology and physiology of vision.

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NOTE: The footnote numbers appearing on preceeding pages refer to the bibliography index numbers shown in the left margin.

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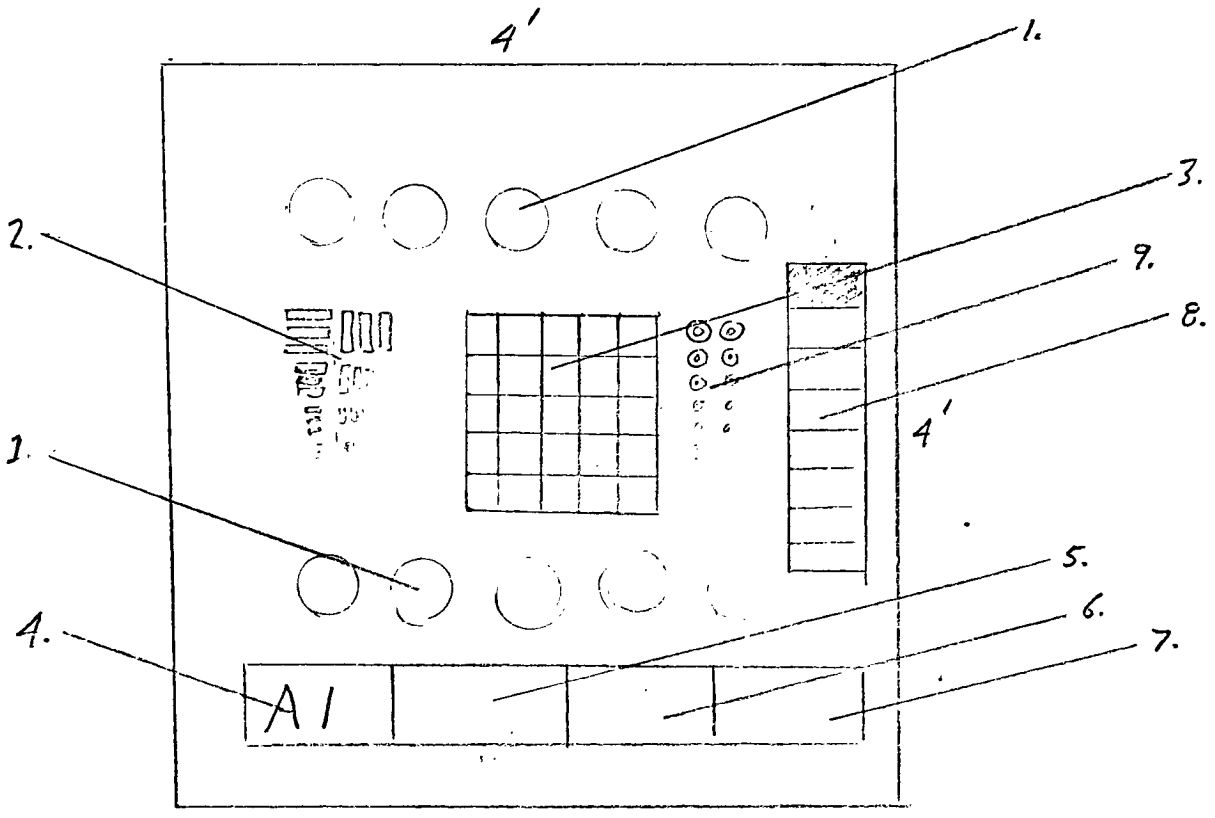
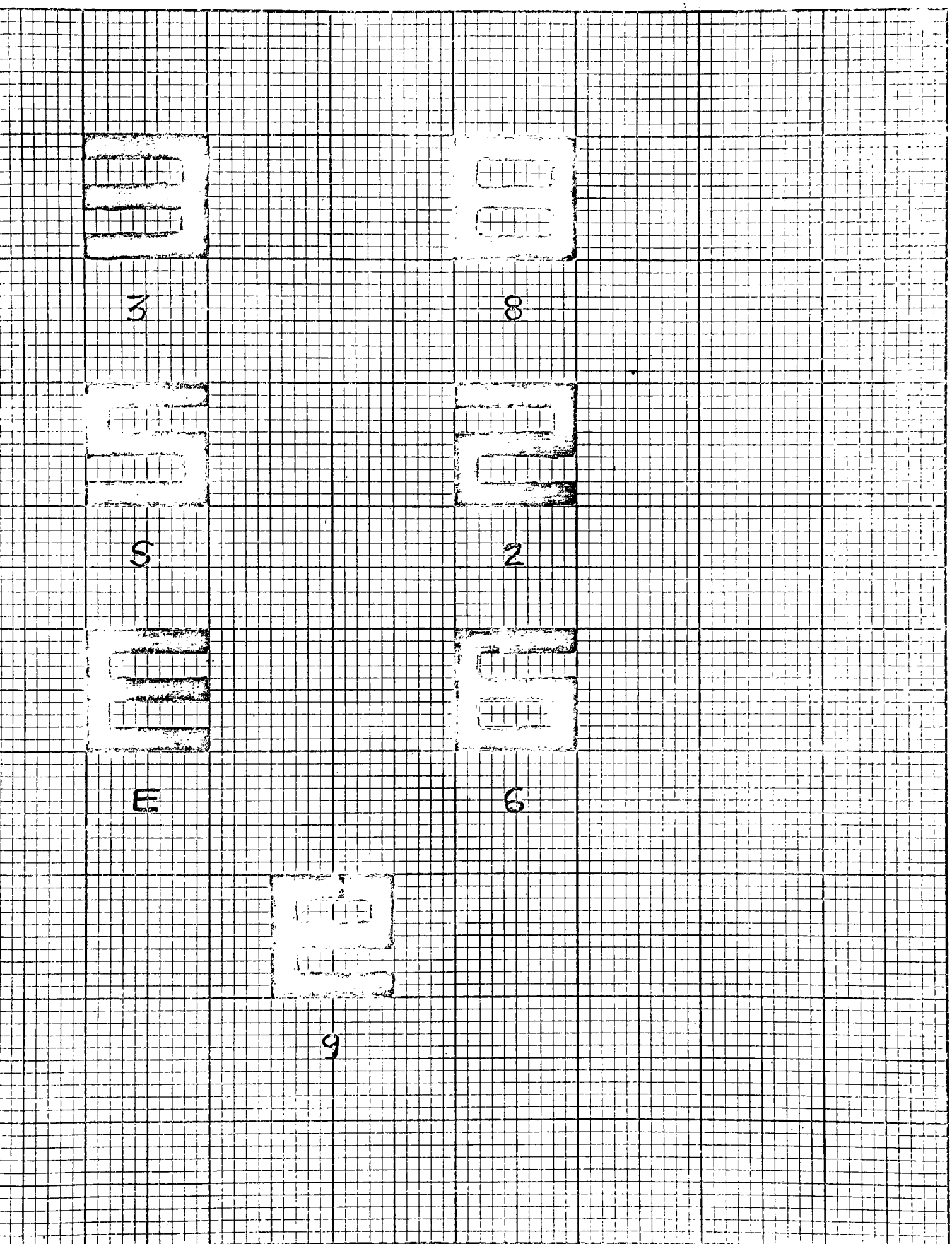
APPENDIX "A"

PROPOSED TARGET FORM FOR GROUND TARGETS



1. Models mounted on 5" dia grey circles
2. USAF Low Contrast resolution target
3. Block Letter Target, letters mounted on 4"x4" grey squares, each square seperated by black 1/4" border.
4. Identification Code
5. 18% grey card
6. White
7. Black
8. 10 step grey card (scale)
9. RCAF Low Cont ast r solution targe

APPENDIX "B"



APPENDIX "C"

Table of models selected as representative targets

Dimensions in mm

Model Code No.	Class Code No.	Description	Length	Width	Mean of L plus W	Sq. Rt. Proj. Area	Sq. Rt. L x W
0	0	Do not know					
1	3	Stake truck (6 wheel)	74	25	49.5	43.0	43.0
2	3	Landrover Stn. Wagon	67	27	47.0	42.5	42.5
3	3	Hopper truck	66	26	46.0	41.5	41.2
4	6	Mustang Sedan	70	27	48.5	43.5	43.5
5	3	Dumper truck	51	27	39.0	37.0	37.1
6	3	Jeep pick-up	65	25	45.0	40.0	40.2
7	6	Jeep 4 x 4	55	28	41.5	40.5	39.3
8	5	'Saladin' Arm. Car	61	29	45.0	42.0	42.0
9	2	Snow-trac	55	33	44.0	41.5	42.7
10	1	Small tractor (farm)	49	29	39.0	30.0	37.7
11	1	Bulldozer Cat D8	58	32	45.0	38.5	43.1
12	2	Gr.Bt 3-ton LKW 4 x 4	49	17	33.0	29.0	28.9
13	2	U.S. M3 half track	50	22	36.0	33.0	33.2
14	5	Gr Bt Recon Sct car	45	24	34.5	34.0	32.8
15	4	USSR Stalin tank	53	25	39.0	36.5	36.3
16	3	U.S. 2½ton 6 x 6	49	19	34.5	30.5	30.5
17	5	U.S. M40 S.P.Cannon	54	26	40.0	37.5	37.5
18	4	U.S. M59 lt tank	47	26	36.5	35.0	34.9
19	3	Gr Bt Ambulance 3-ton 4 x 4	50	18	34.0	30.0	30.0
20	4	USSR T-34 lt tank	47	24	35.5	34.0	33.1
21	2	U.S. M3A1 10 ton half track	48	18	33.0	28.0	29.4
22	4	Centurian tank Mk III	52	26	39.0	37.0	36.7
23	4	USSR T-54 heavy tank	48	26	37.0	35.5	35.3
24	4	Ger. HS20 APC	44	20	32.0	30.0	29.7
25	6	U.S. Jeep 4 x 4	33	15	29.0	22.5	22.2

Class Code No.	Description
0	Do not know
1	Tractor
2	Personnel carrier
3	Truck
4	Tank
5	Armoured car
6	Small cars

TABLE OF SELECTED NEGATIVES USED FOR READINGS

Neg Code	Object dist (ft)	Exposure 'f' stop	speed (sec)	Flare 'f' stop	Exposure speed (sec)	Variation from best visible focus (in mm)	Focal length (mm)	Film type	date	Transmission densities Min	Max
AA	125	4.5	1/200	nil	nil	0	152	5063	30-3-67	0.76	1.10
AB	125	8	1/100	nil	nil	0	152	5063	30-3-67	1.04	1.35
AC	125	32	1/5	nil	nil	0	152	5063	30-3-67	0.56	0.83
AY	70	4.5	1/200	nil	nil	1 plus	152	5063	30-3-67	0.44	0.62
AZ	70	8	1/100	nil	nil	1 "	152	5063	30-3-67	0.44	0.66
BO	50	32	1/5	nil	nil	0	96.07	5063	4-4-67	0.88	1.14
BU	50	32	1	nil	nil	0	96.07	5063	4-4-67	0.98	1.21
BX	30	32	1/5	nil	nil	0	96.07	5063	4-4-67	0.48	0.64
CA	30	4.5	1/25	nil	nil	0	96.07	S0136	4-4-67	1.06	1.51
CC	30	8	1/10	nil	nil	0	96.07	S0136	4-4-67	0.70	1.17
CJ	50	8	1/10	nil	nil	0	96.07	S0136	4-4-67	0.55	0.98
CM	50	11	1/5	nil	nil	0	96.07	S0136	4-4-67	0.68	1.20
CN	50	11	1	nil	nil	0	96.07	S0136	4-4-67	2.10	2.50
DA	90	4.5	1/25	nil	nil	2 plus	152	S0136	4-4-67	0.62	1.06
DB	90	8	1/10	nil	nil	2 "	152	S0136	4-4-67	0.27	0.58
DD	90	4.5	1/25	4.5	1/50	2 "	152	S0136	4-4-67	0.73	1.15
DE	90	8	1/10	4.5	1/50	2 "	152	S0136	4-4-67	0.40	0.66
DS	120	8	1/10	4.5	1/25	0	152	S0136	4-4-67	0.74	1.02
DV	120	8	1/10	4.5	1/10	0	152	S0136	4-4-67	0.70	0.99
DX	120	4.5	1/100	nil	nil	0	152	8403	6-4-67	0.45	0.73
EK	90	8	1/50	8	1/25	0	152	8403	6-4-67	0.60	0.87
EL	90	16	1/10	nil	nil	0	152	8403	6-4-67	0.52	0.68
EO	90	8	1/50	nil	nil	0	152	8403	6-4-67	0.50	0.68
EP	90	32	1	nil	nil	0	152	8403	6-4-67	0.79	0.97
ER	90	8	1/50	nil	nil	2 plus	152	8403	6-4-67	0.44	0.63
ES	90	32	1	nil	nil	2 "	152	8403	6-4-67	0.78	0.95
FA	70	8	1/50	nil	nil	1 minus	152	8403	6-4-67	0.52	0.68
FC	70	32	1	nil	nil	2 plus	152	8403	6-4-67	0.78	0.93
FK	30	32	1	nil	nil	2 minus	96.07	8403	6-4-67	0.91	1.05
FL	30	32	1	nil	nil	1 plus	96.07	8403	6-4-67	0.90	1.06

Note: plus and minus indic tes focus racked forward or back of point of best visual focus

NEGATIVE CODE

SCORING SHEET FOR
BLOCK LETTER TARGET AND
MODEL RECOGNITION

PAGE NO.

ANNULUS RESOLUTION

USAF RESOLUTION

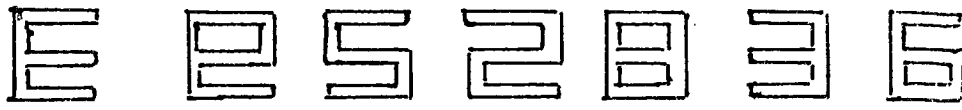
CLASS 1 2 3 4 5

MODEL

CLASS 6 7 8 9 10

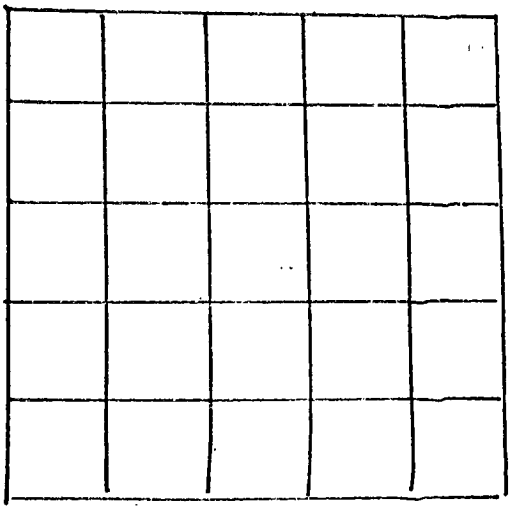
MODEL

MODELS



E 9 S 2 8 3 6

POSSIBLE BLOCK LETTERS PRESENTED



BLOCK LETTER MATRIX

NAME

* NOTE: Please read the instructions on the other side of this sheet before scoring your first negative. Also read the general instruction sheet accompanying the complete set of negatives.

THANK YOU FOR YOUR HELP!

(reverse side of scoring sheet)

INSTRUCTIONS

1. Identify the negative, orient it so that the negative code (two block letters) appears at the top left corner of the negative when viewed through the microscope.

2. Record the negative code.

3. Fill in the USAF and Annulus resolutions in the blocks indicated. The annulus resolution is indicated by a letter, the USAF resolution by a number. Remember the criteria for resolution:

   USAF - If the three bars can be detected, even distorted in shape or joined together in places, the target is resolved.

   ANNULUS - If both rings of any pair are unbroken and have detectable centres of density different than that of the ring, that pair is considered resolved.

4. Fill in a response in all squares of the block letter matrix and model form. If you cannot even guess what letter may be present, put a O in the appropriate square. If you can name the model, you do not need to mark down the class. If you cannot name or class the models, put a O in both the top and bottom portions of the appropriate square.

5. Refer to the photographs of the models as required. Remember that tank turret position, shadows, size relative to other models are not the same as in the negatives you are reading. Do not rely on these clues to identify the models! Where possible, use the model number for identification on the reporting sheet.

INSTRUCTIONS
(Refer to sample sheets #1 & #2)

1. Negative Code: Appears in upper left corner of negative when properly oriented.

2. Page No.: Use numbers to show order in which negatives were read.

3. Date:

4. Models: The two rows of 5 split boxes correspond to the two top rows (of five items) in the negatives. Each small square in the negative (in these two rows) contains a model of a vehicle chosen from the twenty-five shown in the accompanying set of photographs. Each model will only appear once in each negative. If you can identify the model, place its code number in the lower half of the box (as shown in sample 1). If you cannot identify the model, place its class name in the upper half of the box, as shown in some of the boxes in sample 2. Try to identify even if you must guess. The class names are shown on the photographs. If you cannot give a class, put a zero on the box dividing line.

   Notes: a. The shadows shown in the photographic prints will not necessarily correspond to those in the negatives.

   b. All views are vertical.

   c. Gun angle (relative to side of vehicle) changes from negative to negative; do not rely on this as identification.

   d. The models, while accurate in scale within themselves, are not to scale to each other.

5. Block Letter Matrix: The next five lines on the negative contain square cards on which are painted certain block letters (shown on each scoring sheet). These vary in size and type in random order. Note the odd shapes of the "9" and "3". Put whatever you think is on the negative in the corresponding square of the matrix. Again, guessing is encouraged, but if you simply can't tell what letter (or number) is present, put a zero in the appropriate square of the matrix.

6. Annulus Resolution: Down the left side of the target array is a series of annulus targets, lettered a, b, c, d, etc. (largest to smallest). Report the resolution read as shown in samples 1 and 2 (not necessarily the correct resolution at all in these samples). The criteria for resolution is given on the back of each reporting form.

7. USAF Resolution: Down the right side of the target array is a series of USAF 3-Bar targets, numbered 1, 2, 3, 4, etc. Report these as for para 6 above.

General Instructions:

a. It is suggested that each reader examine the samples for 15 to 20 minutes before starting this series of tests. The responses shown on the sample sheets are all correct (except for resolution).

b. There is no time limit in reading these targets; however, first response decided upon is usually correct; hence, try to be quick and do not be afraid of guessing, if you have any clue as to the nature of model or letter.

c. The negatives are arranged in six sets of five negatives. Complete the reading of one set before going on to the next. Each reader should start at a different set and hence maintain a different order of reading the 30 negatives.

APPENDIX "F"

Table of aerial negative parameters

Neg code	'f' stop	focal length (inches)	N.D filter	film type	annulus resolution (lines/mm)	block letter resolution (lines/mm)	scale of * interpretability
112	11	3	nil	5063	11	14	4
117	16	3	nil	5063	22	16	5
118	8	3	nil	5063	18	16	4
119	5.6	3	nil	5063	11	9	3
142	5.6	3	0.6	5063	18	11	2
147	8	3	0.6	5063	14	14	7
148	4	3	0.6	5063	11	11	4
149	2.8	3	0.6	5063	11	9	5
152	11	4	nil	5063	14	16	9
157	16	4	nil	5063	14	11	2
158	8	4	nil	5063	22	12	4
159	5.6	4	nil	5063	8	8	1
214	2	3	nil	S0136	27	16	8
222	4	3	0.3	S0136	18	15	7
223	2.8	3	0.3	S0136	18	19	10
224	2	3	0.3	S0136	11	11	3
242	4	3	0.6	S0136	18	15	6
243	2.8	3	0.6	S0136	11	16	6
244	2	3	0.6	S0136	8	11	5
252	5.6	4	nil	S0136	18	16	4
253	4	4	nil	S0136	27	18	8
254	2.8	4	nil	S0136	14	16	7

Note: All negatives taken at an object distance of 800' and at 1/1000 sec.

'normal' exposure for film type 5063 was 1/1000 at f16

* This scale represented an arbitrary ranking of negatives on a scale of 1 to 10.

```
C.... AETE, UPLANDS
C.... PROGRAMMER F/L MARK A. UNDERHILL
C.... JULY 67
0001      DIMENSION J1(25),J2(25),J3(10),J4(10),I3(25),I4(10)
     1                              K1(7),K2(7),K3(7),K4(25),K5(25),
     2(6),K9(6),K10(25),MB(25,26),MC(8,8),MA(8,8)
0002      DIMENSION E(25),F(25),C(25)
0003      COMMON E,F,C,NTIME,K1,K2,K3,K4,K5,K6,K7,K8,K9
0004      DO 100 NTIME = 1,2
0005      DO 61 L=1,25
0006      K4(L)=0
0007      K5(L)=0
0008   61 K6(L)=0
0009      DO 62 L=1,6
0010      K1(L)=0
0011      K2(L)=0
0012      K3(L)=0
0013      K7(L)=0
0014      K8(L)=0
0015   62 K9(L)=0
0016      K1(7)=0
0017      K2(7)=0
0018      K3(7)=0
0019      DO 10 K=1,25
0020      DO 10 L=1,26
0021   10 MB(K,L)=0
0022      DO 11 K=1,8
0023      DO 11 L=1,8
0024      MC(K,L)=0
0025   11 MA(K,L)=0
0026      DO 20 K=1,30
0027      READ(1,1)I1,J1,J2,J3,J4,J5,J6,J7
0028      DO 21 L=1,J7
0029      READ(1,2)I1,I2,I3,I4,I5,I6,I7
0030      DO 25 N=1,25
0031      M1=J1(N)
0032      M2=I3(N)
0033      M3=M2+1
0034      MA(M1,M3)=MA(M1,M3)+1
0035      IF(M1-M2)23,24,23
0036   24 K2(M1)=K2(M1)+1
0037      GO TO 25
0038   23 IF(M2-0)26,25,26
0039   26 K3(M1)=K3(M1)+1
0040   25 K1(M1)=K1(M1)+1
0041      DO 22 N=1,10
0042      M1=J3(N)
0043      M2=I4(N)
0044      M3=M2+1
0045      MB(M1,M3)=MB(M1,M3)+1
0046      IF(M1-M2)27,28,27
0047   28 K5(M1)=K5(M1)+1
0048      GO TO 22
```

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```
I5(10),
6(25),K7(6),K8
```

```
0049          27 IF(M2-C)29,22,29
005C          29 K6(M1)=K6(M1)+1
0051          22 K4(M1)=K4(M1)+1
0052             DO 3C N=1,1C
0053             M1=J4(N)
0054             M2=I5(N)
0055             M3=M2+1
0056             MC(M1,M3)=MC(M1,M3)+1
0057             IF(M1-M2)31,32,31
0058          32 K8(M1)=K8(M1)+1
0059             GO TO 30
006C          31 IF(M2-C)33,30,33
0061          33 K9(M1)=K9(M1)+1
0062          30 K7(M1)=K7(M1)+1
0063          21 CONTINUE
0064          20 CONTINUE
0065             WRITE(3,111)
0066             IF(NTIME-1)5CC,501,5CC
0067         500 WRITE(3,5C2)
0068             GO TO 70
0069         501 WRITE(3,5C3)
0070          70 WRITE(3,5)(N,N=1,25),(N,(MB(N,M),M=1,26),N=1,25)
0071             WRITE(3,4)(N,(MA(N,M),M=1,8),N,(MC(N,M),M=1,7),N=1,
                1,8)
0072           5 FORMAT(//' MODEL  NCT '5CX'MCDEL READ'/' GIVEN  RE
                1//25(2X,I2,3X,26I4/))
0073           4 FORMAT(///' LETTER NCT  '11X'LETTER READ'18X'MODREC
                1C READ'/' GIVEN  READ  1   2   3   4   5   6   7'14
                2 1   2   3   4   5   6'//6(I4,3X,8I4,14X,I4,3X,7I4/
                3)
0074         5C2 FORMAT(50X'TRAINED CBSERVERS')
0075         503 FORMAT(48X'UNTRAINED CBSERVERS')
0076           2 FORMAT(2I2,25I1,1CI2,12I1)
0077           1 FORMAT(I2,5CI1,1CI2,8I1/2I1,2I3,I2)
0078             CALL MARKA
0079             CALL MARKB
008C             CALL MARKC
0081             CALL MARKC
0082         1CC CONTINUE
0083         111 FORMAT('1')
0084             CALL EXIT
0085             END
```

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```
),(MA(7,M),M=1
'1X,25(I2,2X)
  NOT'11X'MCORE
'GIVEN   READ
,'   7',3X,8I4
```

FCRTRAN IV G LEVEL 0, MCC 0 MARKA DATE = 68022

```
0001          SUBROUTINE MARKA
0002          DIMENSION K1(7),K2(7),K3(7),K4(25),K5(25),K6(25),K7(6),K8(6),K9(6)
             1,K10(25),A(25),B(25),C(25),D(25),F(25)
0003          DIMENSION E(25)
0004          COMMON E,F,C,NTIME,K1,K2,K3,K4,K5,K6,K7,K8,K9
0005          AT=0.
0006          KS=0
0007          KV=0
0008          KU=0
0009          KT=0
0010          DO 10 K=1,7
0011          A(K)=K2(K)
0012          KT=KT+K3(K)
0013          KU=KU+K1(K)
0014       10 KV=KV+K2(K)
0015          DO 11 K=1,7
0016          R=KV
0017          B(K)=K1(K)
0018          S=KU
0019          A(K)=A(K)*S/(R*B(K))
0020          K10(K)=K1(K)-(K2(K)+K3(K))
0021          KS=KS+K10(K)
0022          AT=AT+A(K)
0023          S=K1(K)
0024          R=K2(K)
0025          B(K)=R*100./S
0026          R=K3(K)
0027          C(K)=R*100./S
0028          R=K10(K)
0029       11 D(K)=R*100./S
0030          AT=AT/7.
0031          R=KU
0032          S=KT
0033          CT=S*100./R
0034          S=KS
0035          DT=S*100./R
0036          S=KV
0037          BT=S*100./R
0038          WRITE(3,7)
0039          WRITE(3,3)
0040          DO 16 N=1,7
0041          WRITE(3,4)N,K1(N),K2(N),K3(N),K10(N),B(N),C(N),D(N)
0042       16 F(N)=A(N)
0043          WRITE(3,5)KU,KV,KT,KS,BT,CT,DT,AT
0044        5 FORMAT(/' TOTALS'3X,I4,1X,I4,2X,I4,4X,I4,F10.2,F9.2
             1//)
0045        4 FORMAT(3X,I4,3X,I4,1X,I4,3X,I4,4X,I4,F10.2,F9.2,2X,
0046        3 FORMAT(75H LETTER  TOTAL  COR  WRONG  MISSED  PCNT
             1PCNT MISS    WEIGHT//)
0047        7 FORMAT('1')
0048          RETURN
0049          END
```

,A(N)

,2X,F10.2,F10.4

=10.2,F10.4)

COR PCNT WR

```
0001          SUBROUTINE MARKB
0002          DIMENSION K1(7),K2(7),K3(7),K4(25),K5(25),K6(25),K7(6),K8(6),K9(6)
             1,K10(25),A(25),B(25),C(25),D(25),F(25),E(25)
0003          COMMON E,F,C,NTIME,K1,K2,K3,K4,K5,K6,K7,K8,K9
0004          AT=0.
0005          KS=0
0006          KV=0
0007          KU=0
0008          KT=0
0009          DO 110 K=1,25
0010          B(K)=K5(K)
0011          KT=KT+K6(K)
0012          KU=KU+K4(K)
0013        110 KV=KV+K5(K)
0014          DO 111 K=1,25
0015          R=KV
0016          A(K)=K4(K)
0017          S=KU
0018          B(K)=B(K)*S/(R*A(K))
0019          K10(K)=K4(K)-(K5(K)+K6(K))
0020          KS=KS+K10(K)
0021          AT=AT+B(K)
0022          S=K4(K)
0023          R=K5(K)
0024          A(K)=R*100./S
0025          R=K6(K)
0026          C(K)=R*100./S
0027          R=K10(K)
0028        111 D(K)=R*100./S
0029          AT=AT/25.
0030          R=KU
0031          S=KT
0032          CT=S*100./R
0033          S=KS
0034          DT=S*100./R
0035          S=KV
0036          BT=S*100./R
0037          WRITE(3,13)
0038          DO 116 N=1,25
0039          E(N)=B(N)
0040          WRITE(3,4)N,K4(N),K5(N),K6(N),K10(N),A(N),C(N),D(N),B(N)
0041        116 CONTINUE
0042          WRITE(3,5)KU,KV,KT,KS,BT,CT,DT,AT
0043          5 FORMAT(/' TOTALS'3X,I4,1X,I4,3X,I4,4X,I4,F10.2,F9.2,2X,F10.2,F10.4
             1//)
0044          4 FORMAT(3X,I4,3X,I4,1X,I4,3X,I4,4X,I4,F10.2,F9.2,2X,F10.2,F10.4)
0045          13 FORMAT(2X'MODEL IDENTIFICATION')
0046          RETURN
0047          END
```

```
0001            SUBROUTINE MARKC
0002            DIMENSION K1(7),K2(7),K3(7),K4(25),K5(25),K6(25),K7
               1,K10(25),A(25),B(25),C(25),D(25),F(25),E(25)
0003            COMMON E,F,C,NTIME,K1,K2,K3,K4,K5,K6,K7,K8,K9
0004            AT=0.
0005            KS=0
0006            KV=0
0007            KU=0
0008            KT=0
0009            DO 210 K=1,6
0010            C(K)=K8(K)
0011            KT=KT+K9(K)
0012            KU=KU+K7(K)
0013          210 KV=KV+K8(K)
0014            DO 211 K=1,6
0015            R=KV
0016            B(K)=K7(K)
0017            S=KU
0018            C(K)=C(K)*S/(R*B(K))
0019            K10(K)=K7(K)-(K8(K)+K9(K))
0020            KS=KS+K10(K)
0021            AT=AT+C(K)
0022            S=K7(K)
0023            R=K8(K)
0024            B(K)=R*100./S
0025            R=K9(K)
0026            A(K)=R*100./S
0027            R=K10(K)
0028          211 D(K)=R*100./S
0029            AT=AT/6.
0030            R=KU
0031            S=KT
0032            CT=S*100./R
0033            S=KS
0034            DT=S*100./R
0035            S=KV
0036            BT=S*100./R
0037            WRITE(3,13)
0038            DO 216 N=1,6
0039            WRITE(3,4)N,K7(N),K8(N),K9(N),K10(N),B(N),A(N),D(N)
0040          216 CONTINUE
0041            WRITE(3,5)KU,KV,KT,KS,BT,CT,DT,AT
0042            5 FORMAT(/' TOTALS'3X,I4,1X,I4,3X,I4,4X,I4,F10.2,F9.2
               1//)
0043            4 FORMAT(3X,I4,3X,I4,1X,I4,3X,I4,4X,I4,F10.2,F9.2,2X,
0044           13 FORMAT(2X'MODEL RECOGNITION')
0045            RETURN
0046            END
```

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```
),K8(6),K9(6)

,C(N)

,2X,F10.2,F10.4
=10.2,F10.4)
```

```
FORTRAN IV G LEVEL 0, MOD 0          MARKD                    DATE = 68022
0001                  SUBROUTINE MARKD
0002                  DIMENSION E(25),F(25),C(25),J1(25),J2(25),I3(25),J3
                     110),I5(10),DA(5),DB(5),MA(9),MB(9),SB(5),TC(11),RAM
                     2(11,4),RE(11,4),ND(25,4),NA(25),RA(3),RB(3),JZ(3,30
                     3I(4),TE(4),CG(3,8),CH(3,8),FA(3),FB(3),FC(3),FD(3),
                     4),DT(11)
0003                  COMMON E,F,C,NTIME
0004                  DO 577 N=1,4
0005                  READ(1,7)NA
0006                  DO 577 M=1,25
0007              577 ND(M,N)=NA(M)
0008                  MB(1)=20
0009                  MB(2)=18
0010                  MB(3)=16
0011                  MB(4)=14
0012                  MB(5)=12
0013                  MB(6)=10
0014                  MB(7)=8
0015                  MB(8)=7
0016                  MB(9)=6
0017                  MA(1)=33
0018                  MA(2)=28
0019                  MA(3)=24
002C                  MA(4)=20
0021                  MA(5)=16
0022                  MA(6)=14
0023                  MA(7)=12
0024                  MA(8)=10
0025                  MA(9)=8
0026                  WRITE(3,5)(N,N=1,9)
0027                  KCUNT=0
0028                  DO 276 I=1,3
0029                  FA(I)=0.
0030                  FB(I)=0.
0031                  FC(I)=0.
0032                  FD(I)=0.
0033                  DO 276 J=1,8
0034                  CH(I,J)=0.
0035              276 CG(I,J)=0.
0036                  DO 277 I=1,8
0037                  CE(I)=0.
0038              277 CF(I)=0.
0039                  DO 278 I=1,11
0040              278 VAR(I)=0.
0041                  DO 20 K=1,30
0042                  READ(1,1)I1,J1,J2,J3,J4,J5,J6,J7
0043                  RLET=0.
0044                  P=J5
0045                  Q=J6
0046                  FAC=304.8*P/Q
0047                  DO 70 I=1,11
0048                  DT(I)=0.
0049                  RAM(I)=0.
```

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```
),J4(10),I4(
),RUM(11),RI
E(8),CF(8),T
(11),OX(30,8
```

FORTRAN IV G LEVEL 0, MOD 0 MARKC DATE = 68022

```
0050                TO(I)=0.
0051                RUM(I)=0.
0052                DO 70 J=1,4
0053                RI(I,J)=0.
0054             70 RE(I,J)=0.
0055                DO 71 I=1,4
0056                TI(I)=0.
0057             71 TE(I)=0.
0058                RAT=0.
0059                RUT=0.
0060                DO 21 L=1,J7
0061                READ(1,2)I1,I2,I3,I4,I5,I6,I7
0062                R=MA(I6)
0063                RX=FAC/R
0064                R=MB(I7)
0065                RU=FAC/R
0066                RAT=RAT+RX
0067                RUT=RUT+RU
0068                RAM(L)=RX
0069                RUM(L)=RU
0070                DO 550 LX=1,4
0071                Z1=0.
0072                Z2=0.
0073                Z3=0.
0074                Y1=0.
0075                Y2=0.
0076                Y3=0.
0077                P1=75.
0078                P2=75.
0079                P3=75.
0080                P4=75.
0081                P5=75.
0082                P6=75.
0083                P7=75.
0084                P8=75.
0085                DO 30 N=1,10
0086                M1=J3(N)
0087                M2=J4(N)
0088                M3=I4(N)
0089                M4=I5(N)
0090                R=NC(M1,LX)
0091                S=R
0092                R=R*E(M1)/100.
0093                S=S*C(M2)/100.
0094                IF(M1-M3)41,32,41
0095             32 Z1=Z1+R
0096                IF(R-P1)33,33,34
0097             33 P4=P3
0098                P3=P2
0099                P2=P1
0100                P1=R
0101                GO TO 43
0102             34 IF(R-P2)35,35,36
```

FORTRAN IV G LEVEL 0, MOD 0 MARKD DATE = 68022

```
0103          35 P4=P3
0104             P3=P2
0105             P2=R
0106             GO TO 43
0107          36 IF(R-P3)37,37,38
0108          37 P4=P3
0109             P3=R
0110             GO TO 43
0111          38 IF(R-P4)39,39,43
0112          39 P4=R
0113             GO TO 43
0114          41 IF(M3-0)42,500,42
0115          42 Z3=Z3+R
0116             GO TO 43
0117         500 Z2=Z2+R
0118          43 IF(M2-M4)61,52,61
0119          52 Y1=Y1+S
0120             IF(S-P5)53,53,54
0121          53 P8=P7
0122             P7=P6
0123             P6=P5
0124             P5=S
0125             GO TO 30
0126          54 IF(S-P6)55,55,56
0127          55 P8=P7
0128             P7=P6
0129             P6=S
0130             GO TO 30
0131          56 IF(S-P7)57,57,58
0132          57 P8=P7
0133             P7=S
0134             GO TO 30
0135          58 IF(S-P8)59,59,30
0136          59 P8=S
0137             GO TO 30
0138          61 IF(M4-0)62,501,62
0139          62 Y3=Y3+S
0140             GO TO 30
0141         501 Y2=Y2+S
0142          30 CONTINUE
0143             R=(Z1-Z3/24.)/(Z1+Z2+Z3)
0144             Z1=(P1+P2+P3+P4)/(4.+4.*R)
0145             S=(Y1-Y3/5.)/(Y1+Y2+Y3)
0146             Y1=(P5+P6+P7+P8)/(4.+4.*S)
0147             RI(L,LX)=FAC*R/Z1
0148         550 RE(L,LX)=FAC*S/Y1
0149             DO 10 ML=1,5
0150             DA(ML)=0.
0151             DB(ML)=0.
0152          10 SB(ML)=0.
0153             DO 11 N=1,25
0154             M1=J1(N)
0155             M2=I3(N)
```

FORTRAN IV G LEVEL 0, MOD 0 MARKD DATE = 68022

```
0156            M3=J2(N)-3
0157            IF(M1-M2)12,13,12
0158         13 DA(M3)=DA(M3)+F(M1)
0159            GO TO 14
0160         12 IF(M2-C)15,14,15
0161         15 SB(M3)=SB(M3)+F(M1)
0162         14 DB(M3)=DB(M3)+F(M1)
0163         11 CONTINUE
0164            DO 16 N=1,5
0165         16 SB(N)=(DA(N)-SB(N)/6.)/DB(N)
0166            T=0.
0167            DO 29 N=1,5
0168         29 T=T+2.4*SB(N)
0169            TO(L)=FAC/(18.-T)
0170            RLET=RLET+TC(L)
0171            DO 21 N=1,4
0172            TI(N)=TI(N)+RI(L,N)
0173         21 TE(N)=TE(N)+RE(L,N)
0174            R=J7
0175            RA(1)=RAT/R
0176            RA(2)=RUT/R
0177            RA(3)=RLET/R
0178            DO 700 M=1,3
0179            JZ(M,K)=RA(M)+.5
0180        700 RB(M)=JZ(M,K)
0181            DO 701 M=1,4
0182            TI(M)=TI(M)/R
0183            TE(M)=TE(M)/R
0184            CE(M)=CE(M)+TI(M)
0185            CF(M)=CF(M)+TI(M)*TI(M)
0186            CE(M+4)=CE(M+4)+TE(M)
0187            CF(M+4)=CF(M+4)+TE(M)*TE(M)
0188            DO 701 N=1,3
0189            CG(N,M)=CG(N,M)+TI(M)*RB(N)
0190            CH(N,M)=CH(N,M)+TI(M)*RB(N)*RB(N)
0191            CG(N,M+4)=CG(N,M+4)+TE(M)*RB(N)
0192        701 CH(N,M+4)=CH(N,M+4)+TE(M)*RB(N)*RB(N)
0193            DO 702 N=1,3
0194            FF=JZ(N,K)
0195            FA(N)=FA(N)+FF
0196            FB(N)=FB(N)+FF**2
0197            FC(N)=FC(N)+FF**3
0198        702 FD(N)=FD(N)+FF**4
0199            DO 703 M=1,J7
0200            DT(1)=DT(1)+(RAM(M)-RA(1))**2
0201            DT(2)=DT(2)+(RUM(M)-RA(2))**2
0202            DT(3)=DT(3)+(TO(M)-RA(3))**2
0203            DO 703 N=4,7
0204            DT(N)=DT(N)+(RI(M,N-3)-TI(N-3))**2
0205        703 DT(N+4)=DT(N+4)+(RE(M,N-3)-TE(N-3))**2
0206            DO 737 N=1,11
0207        737 VAR(N)=VAR(N)+DT(N)
0208            DO 738 N=1,4
```

```
0209            OX(K,N)=TI(N)
0210        738 OX(K,N+4)=TE(N)
0211            WRITE(3,704)K,(RA(N),N=1,9),RA(1),JZ(1,K),DT(1),(RM(
               1(2),JZ(2,K),DT(2),(TC(N),N=1,9),RA(3),JZ(3,K),DT(3),((
               29),TI(M),DT(M+3),M=1,4),((RE(N,M),N=1,9),TE(M),DT(M+7)
0212            KOUNT=KOUNT+1
0213            IF(KOUNT-5)20,706,706
0214        706 WRITE(3,111)
0215            KOUNT=0
0216         20 CONTINUE
0217            WRITE(3,729)
0218            DO 710 N=1,11
0219        710 VAR(N)=VAR(N)/30.
0220            DO 711 I=1,3
0221            DO 711 J=1,8
0222            EX=0.
0223            KDF=0
0224            DO 705 L=1,35
0225            X=0.
0226            Y=0.
0227            KK=-1
0228            DO 707 K=1,30
0229            IF(JZ(I,K)-L)707,708,707
0230        708 X=X+OX(K,J)**2
0231            Y=Y+OX(K,J)
0232            KK=KK+1
0233        707 CONTINUE
0234            IF(KK-0)705,705,720
0235        720 P8=KK+1
0236            EX=EX+X-Y**2/P8
0237            KDF=KDF+KK
0238        705 CONTINUE
0239            P1=FA(I)
0240            P2=FB(I)
0241            P3=FC(I)
0242            P4=FD(I)
0243            B0=CE(J)**2/30.
0244            P5=P2-P1**2/30.
0245            P6=P3-P1*P2/30.
0246            P7=CG(I,J)-P1*CE(J)/30.
0247            B1=P7**2/P5
0248            P7=P7/P5
0249            P6=P6/P5
0250            P8=P4-P6*P6*P5-P2*P2/30.
0251            P9=CH(I,J)-P7*P6*P5-CE(J)*P2/30.
0252            B2=P9*P9/P8
0253            P9=P9/P8
0254            BC1=P7-P6*P9
0255            BC0=(CE(J)-P1*BC1-P2*P9)/30.
0256            BL0=(CE(J)-P1*P7)/30.
0257            S=P5*(CF(J)-B0)
0258            IF(S)170,170,171
0259        170 P6=1.
```

```
JM(N),N=1,9),RA
,((RI(N,M),N=1,
7),M=1,4)
```

```
0260            GO TO 172
0261        171 P6=P7*P5/SQRT(S)
0262        172 P1=CF(J)-B0-B1
0263            P2=P1-B2
0264            P3=KDF
0265            P4=(P1-EX)*P3/((28.-P3)*EX)
0266            P5=(P2-EX)*P3/((27.-P3)*EX)
0267            IF(P1)173,173,174
0268        173 P1=C.
0269            GO TO 175
0270        174 P1=SQRT(P1/28.)
0271        175 IF(P2)176,176,177
0272        176 P2=C.
0273            GO TO 178
0274        177 P2=SQRT(P2/27.)
0275        178 IF(J-4)800,800,802
0276        800 NCODE=J*1000+I*100+10+NTIME
0277            GO TO 711
0278        802 NCODE=(J-4)*1000+I*100+20+NTIME
0279        711 WRITE(3,730)NCODE,B00,B01,P9,P5,P2,P6,EX,KDF,CE(J),CF(J
               1H(I,J),VAR(I),BLC,P7,P4,P1,P6,FA(I),FE(I),FC(I),FD(I),V
0280          5 FORMAT('1'40X'RESOLUTION RESULTS'//' TARGET NEC'3X'RE
               1E   NC'9I7'     AVG  CODE  VARIATION'/)
0281        704 FORMAT(/' RCAF'3X,I2,2X,10F7.2,I5,F9.4/' USAF'7X,10F7.2
               1LETTER'5X,10F7.2,I5,F9.4/' IDN 1'6X,10F7.2,5X,F9.4/' ID
               2.2,5X,F9.4/' IDN 3'6X,10F7.2,5X,F9.4/' IDN 4'6X,10F7.2,
               3EC 1'6X,10F7.2,5X,F9.4/' REC 2'6X,10F7.2,5X,F9.4/' REC
               4,5X,F9.4/' REC 4'6X,10F7.2,5X,F9.4)
0282        729 FORMAT('1'52X'REGRESSION ANALYSIS'//6X'CODE'5X'COEFICI
               1C F'42X'PARTIAL SUM AND VARIANCES'/8X'NO   B0'5X'B1'5
               2FIT  SYX   R'5X'ERROR  DF   SUM Y'6X'SUM YY'5X'SUM XY'
               3  VAR X'/67X'SUM X'6X'SUM XX'5X'SUM XXX   SUM XXX
0283        730 FORMAT(' CURVE 'I4,5F7.3,F7.4,F7.3,I4,5F11.4/' LIN'6X,
               17.3,F7.4,11X,4F11.0,F11.4/)
0284        111 FORMAT('1')
0285          1 FORMAT(I2,5CI1,10I2,8I1/2I1,2I3,I2)
0286          2 FORMAT(2I2,25I1,1CI2,12I1)
0287          7 FORMAT(20I4/5I4)
0288            RETURN
0289            END
```

```
CF(J),CG(I,J),C
F),VAR(J+3)
X'READER'/' TYP

F7.2,I5,F9.4/'
' IDN 2'6X,10F7
7.2,5X,F9.4/' R
REC 3'6X,10F7.2

FICIENTS'4X'CAL
B1'5X'B2  LACK
 XY'5X'SUM XXY
X'  VAR Y'/)
'6X,2F7.3,7X,2F
```

TABLE 1

UNTRAINED OBSERVERS

MODEL GIVEN	NOT READ	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	15	72	11	3	1	0	2	12	0	1	0	0	0	2	0	0	7
2	15	6	38	4	11	0	9	0	0	0	0	0	0	1	0	1	2
3	6	8	0	16	0	2	2	0	0	0	0	4	1	2	0	0	5
4	13	0	13	0	35	0	11	1	1	0	0	0	0	0	0	1	0
5	11	2	1	1	2	37	2	3	0	2	0	0	1	2	1	0	5
6	26	2	6	5	6	4	38	1	0	1	0	0	2	12	3	0	0
7	7	0	0	1	1	1	2	18	0	2	0	0	0	0	1	0	0
8	26	0	1	0	0	0	0	6	76	3	0	3	0	0	8	2	0
9	6	0	2	0	3	2	2	16	0	45	0	3	0	5	1	0	1
10	5	0	0	0	0	1	0	0	0	0	124	0	0	0	0	0	0
11	27	0	0	0	0	4	0	4	2	4	9	51	0	1	2	1	3
12	15	0	0	0	0	0	0	0	0	0	0	0	37	0	0	0	2
13	47	0	0	0	0	1	3	1	1	2	1	1	3	25	2	1	0
14	11	0	0	0	0	0	1	4	1	0	3	0	0	0	42	0	2
15	24	0	0	0	0	1	1	3	0	1	3	1	0	3	10	13	10
16	26	1	0	1	0	0	0	0	0	0	0	0	17	3	0	1	1
17	34	1	1	0	1	1	2	1	0	2	2	2	1	1	2	4	0
18	22	0	0	2	1	1	1	2	1	2	0	0	0	0	0	1	3
19	6	2	0	2	0	0	0	1	0	0	0	0	4	0	1	0	1
20	34	0	0	0	0	2	0	0	3	1	2	1	0	0	5	1	4
21	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	40	0	0	0	1	3	0	5	2	2	2	4	1	0	6	4	0
23	19	0	0	0	0	2	0	3	1	4	0	4	0	0	4	0	0
24	31	0	0	0	0	5	0	2	1	0	0	0	0	1	3	1	1
25	23	1	0	1	0	0	0	0	0	1	0	0	1	1	4	0	0

TABLE 2

LETTER GIVEN	NOT READ	LETTER READ 1	2	3	4	5	6	7
1	82	406	11	42	52	56	78	33
2	97	2	526	41	48	20	16	36
3	125	19	16	574	13	31	11	19
4	112	11	15	17	535	13	63	17
5	99	39	3	139	11	439	19	91
6	91	27	15	36	98	9	476	54
7	54	11	7	34	15	23	32	490

TABLE 3

MODREC GIVEN	NOT READ	1
1	17	185
2	36	6
3	11	4
4	66	22
5	10	6
6	10	0

16	17	18	19	20	21	22	23	24	25
7	0	0	5	0	1	0	0	0	0
2	2	0	0	0	2	3	0	1	0
5	1	0	2	1	0	0	0	0	0
0	5	1	0	1	0	3	0	1	1
0	0	0	1	0	0	0	0	0	1
5	0	0	0	0	1	1	1	3	0
0	1	0	0	0	0	1	0	1	0
0	0	1	0	2	0	2	1	0	0
0	0	0	0	1	0	1	0	0	0
1	0	0	0	0	0	0	0	0	0
0	0	0	1	0	1	0	0	0	2
3	0	0	4	0	7	0	0	0	0
2	0	1	3	0	3	1	0	7	5
0	0	1	0	0	0	0	0	0	1
2	1	3	0	10	0	1	0	1	3
10	0	0	12	0	20	0	0	3	0
1	44	2	0	24	1	2	1	0	0
0	0	22	0	2	0	0	4	2	2
3	0	0	27	1	1	0	0	1	2
1	1	3	0	2	0	1	4	2	2
4	1	1	6	0	20	0	0	0	1
0	1	2	0	12	0	19	12	0	1
0	1	6	0	1	0	2	17	1	0
1	0	1	2	1	7	0	2	3	10
0	0	0	0	0	0	0	0	1	46

NODREC READ

3	4	5	6
8	10	4	7
55	25	10	32
419	32	9	43
51	315	49	47
3	27	125	15
40	26	7	110

TABLE 4

LETTER	TOTAL	COR	WRONG	MISSED	PCNT COR	PCNT WR	PCNT MISS	WEIGH
1	760	406	272	82	53.42	35.79	10.79	0.844
2	786	526	163	97	66.92	20.74	12.34	1.05
3	808	574	109	125	71.04	13.49	15.47	1.12
4	783	535	136	112	68.33	17.37	14.30	1.080
5	840	439	302	99	52.26	35.95	11.79	0.82
6	807	476	240	91	58.98	29.74	11.28	0.93
7	666	490	122	54	73.57	18.32	8.11	1.16
TOTALS	5450	3446	1344	660	63.23	24.66	12.11	1.00

MODEL IDENTIFICATION

1	132	72	45	15	54.55	34.09	11.36	1.35
2	95	38	42	15	40.00	44.21	15.79	0.99
3	50	16	28	6	32.00	56.00	12.00	0.79
4	87	35	39	13	40.23	44.83	14.94	1.00
5	67	37	19	11	55.22	28.36	16.42	1.31
6	117	38	53	26	32.48	45.30	22.22	0.8
7	36	18	11	7	50.00	30.56	19.44	1.2
8	131	76	29	26	58.02	22.14	19.85	1.4
9	87	45	36	6	51.72	41.38	6.90	1.28
10	131	124	2	5	94.66	1.53	3.82	2.35
11	109	51	31	27	46.79	28.44	24.77	1.16
12	66	37	14	15	56.06	21.21	22.73	1.39
13	110	25	38	47	22.73	34.55	42.73	0.56
14	64	42	11	11	65.63	17.19	17.19	1.63
15	81	13	44	24	16.05	54.32	29.63	0.39
16	94	10	58	26	10.64	61.70	27.66	0.26
17	130	44	52	34	33.85	40.00	26.15	0.84
18	65	22	21	22	33.85	32.31	33.85	0.84
19	51	27	18	6	52.94	35.29	11.76	1.31
20	65	2	29	34	3.08	44.62	52.31	0.07
21	80	20	22	38	25.00	27.50	47.50	0.62
22	117	19	58	40	16.24	49.57	34.19	0.40
23	65	17	29	19	26.15	44.62	29.23	0.65
24	71	3	37	31	4.23	52.11	43.66	0.10
25	79	46	10	23	58.23	12.66	29.11	1.44
TOTALS	2180	877	776	527	40.23	35.60	24.17	0.97

MODEL RECOGNITION

1	240	185	38	17	77.08	15.83	7.08	1.26
2	343	179	128	36	52.19	37.32	10.50	0.85
3	606	419	176	11	69.14	29.04	1.82	1.13
4	594	315	213	66	53.03	35.86	11.11	0.86
5	195	125	60	10	64.10	30.77	5.13	1.04
6	202	110	82	10	54.46	40.59	4.95	0.
TOTALS	2180	1333	697	150	61.15	31.97	6.88	1.0

RESOLUTION RESULTS

TARGET TYPE	NEG NO	READER 1	2	3	4	5	6	7	8	9
RCAF	1	10.44	12.53	12.53	12.53	10.44	15.67	12.53	15.67	10.
USAF		20.89	20.89	20.89	20.89	20.89	25.07	20.89	20.89	20.
LETTER		17.57	17.42	15.74	17.01	16.26	20.82	17.28	19.12	18.
IDN 1		0.60	1.82	3.17	1.42	1.95	1.27	0.60	1.23	11.
IDN 2		0.55	2.15	3.78	1.35	2.28	1.32	0.55	1.33	11.
IDN 3		0.66	2.17	3.61	1.45	2.27	1.39	0.67	1.40	11.
IDN 4		0.70	2.29	3.85	1.49	2.40	1.46	0.70	1.47	1.
REC 1		2.82	2.60	6.94	0.35	3.56	3.77	3.09	2.00	3.
REC 2		3.97	3.92	10.08	0.29	5.37	5.56	4.43	2.83	5.
REC 3		3.69	3.56	9.25	0.38	4.87	5.08	4.08	2.63	5.
REC 4		3.87	3.84	9.83	0.38	5.29	5.46	4.31	2.82	5.
RCAF	2	15.67	15.67	15.67	15.67	15.67	15.67	15.67	0.0	0.
USAF		25.07	31.33	25.07	20.89	25.07	25.07	31.33	0.0	0.
LETTER		21.67	25.52	25.83	19.93	21.75	26.17	27.32	0.0	0.
IDN 1		6.74	1.43	2.23	2.03	0.63	2.22	1.96	0.0	0.
IDN 2		9.96	1.37	2.49	2.44	0.59	2.48	2.19	0.0	0.
IDN 3		9.04	1.46	2.46	2.38	0.70	2.45	2.20	0.0	0.
IDN 4		9.67	1.49	2.57	2.53	0.73	2.57	2.32	0.0	0.
REC 1		6.70	1.60	4.91	2.55	1.59	5.16	2.65	0.0	0.
REC 2		9.74	2.27	7.23	3.76	2.28	7.42	3.90	0.0	0.
REC 3		8.75	2.07	6.45	3.37	2.09	6.60	3.49	0.0	0.
REC 4		9.35	2.22	6.86	3.59	2.25	6.97	3.70	0.0	0.
RCAF	3	12.53	12.53	10.44	10.44	20.89	15.67	17.90	0.0	0.
USAF		17.90	17.90	15.67	15.67	17.90	17.90	20.89	0.0	0.
LETTER		22.26	23.63	20.17	23.11	21.38	26.87	22.73	0.0	0.
IDN 1		2.09	5.57	2.13	2.23	4.31	0.74	3.12	0.0	0.
IDN 2		2.42	8.03	2.45	2.48	5.92	0.67	3.80	0.0	0.
IDN 3		2.45	7.46	2.46	2.52	5.57	0.79	3.71	0.0	0.
IDN 4		2.54	7.96	2.54	2.62	5.96	0.82	3.90	0.0	0.
REC 1		4.31	9.40	3.07	1.66	5.66	1.69	2.77	0.0	0.
REC 2		6.03	12.86	4.43	2.43	8.04	2.44	4.01	0.0	0.
REC 3		5.50	12.34	4.04	2.28	7.30	2.27	3.76	0.0	0.
REC 4		5.78	13.00	4.25	2.46	7.66	2.42	4.03	0.0	0.
RCAF	4	5.85	7.02	5.85	4.25	8.77	7.02	7.02	0.0	0.
USAF		10.03	11.70	10.03	8.77	14.04	10.03	10.03	0.0	0.
LETTER		10.34	11.43	9.63	8.63	12.86	11.54	9.03	0.0	0.
IDN 1		-0.01	0.25	-0.05	0.31	0.12	1.01	0.36	0.0	0.
IDN 2		-0.01	0.26	-0.05	0.36	0.16	1.34	0.41	0.0	0.
IDN 3		-0.01	0.26	-0.05	0.34	0.14	1.26	0.39	0.0	0.
IDN 4		-0.01	0.26	-0.05	0.36	0.16	1.34	0.41	0.0	0.
REC 1		0.49	1.54	0.37	0.94	0.39	1.53	0.34	0.0	0.
REC 2		0.68	2.30	0.56	1.47	0.54	2.27	0.43	0.0	0.
REC 3		0.63	2.13	0.50	1.33	0.50	2.11	0.41	0.0	0.
REC 4		0.68	2.31	0.56	1.47	0.54	2.28	0.43	0.0	0.
RCAF	5	7.02	8.77	7.02	7.02	8.77	7.02	10.03	0.0	0.
USAF		11.70	14.04	14.04	14.04	14.04	11.70	17.55	0.0	0.
LETTER		14.31	15.30	16.44	15.24	13.56	13.13	15.52	0.0	0.
IDN 1		1.62	1.50	3.05	3.85	5.63	2.22	1.18	0.0	0.
IDN 2		2.11	2.00	4.75	5.92	8.47	3.22	1.40	0.0	0.
IDN 3		2.02	1.95	4.39	5.45	7.86	3.02	1.39	0.0	0.
			2.10	4.88	6.01	8.59	3.36	1.48	0.0	0.

	AVG	CODE	VARIATION
4	12.53	13	32.7236
9	21.35	21	15.5134
8	17.83	18	20.7797
1	1.50		4.8647
4	1.63		8.0089
4	1.67		6.6557
7	1.76		7.6515
5	3.23		25.0375
9	4.67		55.1318
3	4.30		45.2504
4	4.58		51.4451
	15.67	16	0.0
	26.26	26	86.0163
	24.03	24	48.3784
	2.46		23.2578
	3.08		58.3799
	2.95		45.8297
	3.13		52.8515
	3.59		23.7982
	5.23		50.6010
	4.69		40.0036
	4.99		45.2176
	14.34	14	94.2272
	17.69	18	18.6037
	22.88	23	26.4954
	2.88		15.4833
	3.68		37.5691
	3.56		30.4427
	3.76		35.3955
	4.08		45.1075
	5.75		82.6554
	5.35		75.8833
	5.66		83.2271
	6.54	7	11.8566
	10.66	11	17.6460
	10.50	10	13.9702
	0.28		0.7583
	0.35		1.3143
	0.33		1.1747
	0.35		1.3127
	0.80		1.7615
	1.18		4.1676
	1.09		3.5511
	1.18		4.1994
	7.95	8	9.1372
	13.87	14	23.0653
	14.79	15	8.2446
	2.72		15.1653
	3.98		29.1391
	3.72		32.5749

REC 3		1.23	5.23	6.67	6.67	6.67	5.26	2.82	C.C	0.
REC 4		1.37	5.61	7.16	7.16	7.16	5.71	3.10	C.C	0.
RCAF	6	7.94	13.23	13.23	7.94	7.94	9.92	15.87	C.C	0.
USAF		15.87	15.87	19.84	15.87	19.84	13.23	22.68	0.0	0.
LETTER		12.39	14.45	14.49	13.59	16.81	15.17	15.76	C.0	C.
IDN 1		1.15	2.45	3.50	1.75	4.70	2.47	C.59	0.C	C.
IDN 2		1.19	3.15	5.18	1.98	7.34	3.25	0.55	C.0	0.
IDN 3		1.29	3.10	4.92	2.04	6.72	3.14	0.65	C.C	0.
IDN 4		1.34	3.29	5.40	2.12	7.45	3.36	0.68	C.C	0.
REC 1		C.82	2.80	3.03	1.21	4.15	3.02	1.79	C.C	0.
REC 2		1.06	4.06	4.44	1.71	5.92	4.42	2.67	0.0	0.
REC 3		1.04	3.90	4.02	1.63	5.65	4.01	2.56	C.0	0.
REC 4		1.11	4.26	4.31	1.75	6.10	4.29	2.84	C.C	0.
RCAF	7	4.76	4.76	4.76	4.76	5.95	3.97	4.76	5.95	0.
USAF		9.52	7.94	9.52	7.94	7.94	6.80	7.94	9.52	0.
LETTER		9.95	8.79	8.69	9.26	7.23	8.92	8.48	8.53	0.
IDN 1		C.67	2.24	1.38	1.35	C.74	C.65	1.33	C.24	0.
IDN 2		C.79	3.48	2.02	1.99	C.91	0.76	1.94	C.22	C.
IDN 3		C.78	3.03	1.87	1.84	C.88	C.77	1.81	C.25	0.
IDN 4		C.84	3.43	2.08	2.04	C.94	C.81	2.02	C.27	C.
REC 1		C.65	3.01	1.68	3.14	3.01	1.67	2.68	C.39	0.
REC 2		C.98	4.49	2.45	4.67	4.39	2.43	4.13	C.51	0.
REC 3		C.87	4.09	2.15	4.16	3.96	2.14	3.63	C.48	0.
REC 4		C.96	4.62	2.33	4.62	4.38	2.32	4.09	C.53	0.
RCAF	8	6.80	6.80	6.80	7.94	9.52	6.80	6.80	C.C	0.
USAF		13.61	13.61	13.61	13.61	15.87	13.61	13.61	C.C	0.
LETTER		12.64	13.51	12.70	10.75	12.64	13.63	12.64	C.0	0.
IDN 1		3.17	3.21	3.19	2.35	2.74	4.04	1.74	C.0	0.
IDN 2		4.70	4.69	4.57	3.62	4.05	5.96	2.70	C.C	0.
IDN 3		4.17	4.15	4.13	3.28	3.69	5.26	2.41	C.C	0.
IDN 4		4.77	4.66	4.65	3.74	4.07	6.01	2.71	C.0	0.
REC 1		4.77	2.90	3.79	3.69	2.96	3.59	2.94	C.C	0.
REC 2		6.86	4.16	5.48	5.35	4.34	5.33	4.34	C.C	0.
REC 3		6.20	3.71	4.91	4.85	3.92	4.80	3.91	C.C	0.
REC 4		6.87	4.08	5.48	5.34	4.26	5.40	4.26	C.C	0.
RCAF	9	3.97	4.76	4.76	4.76	3.97	6.80	4.76	0.C	0.
USAF		7.94	7.94	9.52	9.52	6.80	9.52	9.52	0.0	0.
LETTER		5.68	6.80	7.13	7.74	6.74	6.57	7.04	C.0	0.
IDN 1		C.29	0.28	0.88	C.28	0.C	-0.01	0.27	C.C	0.
IDN 2		C.27	0.26	0.96	0.26	0.C	-0.01	0.26	0.C	0.
IDN 3		C.31	0.30	0.94	0.30	0.0	-0.01	0.29	0.C	0.
IDN 4		C.33	0.32	1.01	0.32	C.C	-0.01	0.31	C.C	C.
REC 1		1.42	1.77	1.33	2.46	0.0	0.27	1.22	C.0	0.
REC 2		2.03	2.47	1.91	3.48	0.C	0.33	1.74	0.0	0.
REC 3		1.84	2.24	1.72	3.19	0.0	0.31	1.58	0.0	0.
REC 4		1.96	2.40	1.86	3.43	C.C	0.32	1.70	C.C	C.
RCAF	10	7.94	7.94	7.94	9.52	9.52	9.52	9.52	9.52	C.
USAF		15.87	15.87	15.87	15.87	13.61	15.87	15.87	15.87	0.
LETTER		13.63	13.74	11.66	14.66	12.08	15.87	14.68	15.87	0.
IDN 1		3.34	2.36	4.00	3.33	3.16	3.01	2.59	5.63	0.
IDN 2		4.87	3.54	5.95	4.73	4.56	4.35	3.59	8.14	0.
IDN 3		4.38	3.20	5.24	4.31	4.14	3.95	3.39	7.13	0.
IDN 4		4.97	3.65	5.99	4.84	4.66	4.42	3.69	8.19	0.
REC 1		3.86	3.03	4.56	4.56	3.84	3.50	3.70	3.66	0.
REC 2		5.45	4.30	6.55	6.55	5.39	5.11	5.21	5.22	0.
REC 3		5.03	3.91	5.95	5.95	4.99	4.64	4.87	4.78	0.

0	5.33		27.4251 30.9870
0	10.87	11	62.8788
0	17.60	18	63.8915
0	14.67	15	12.4762
0	2.37		11.7764
0	3.23		33.6039
0	3.12		26.8048
0	3.38		33.6770
0	2.40		8.2932
0	3.47		17.7492
0	3.26		15.3069
0	3.52		17.7981
0	4.96	5	3.1502
0	8.39	8	7.2004
0	8.73	9	4.1764
0	1.08		2.7405
0	1.51		7.6561
0	1.40		5.5927
0	1.55		7.3423
0	2.03		8.4194
0	3.01		19.1003
0	2.69		15.3872
0	2.98		19.4865
0	7.35	7	6.5686
0	13.93	14	4.4084
0	12.64	13	5.3213
0	2.92		3.2330
0	4.33		6.2337
0	3.87		4.6718
0	4.37		6.2323
0	3.52		2.7128
0	5.12		5.3997
0	4.61		4.5009
0	5.10		5.8754
0	4.83	5	5.3966
0	8.68	9	7.4796
0	6.82	7	2.3516
0	0.28		0.5205
0	0.28		0.6247
0	0.31		0.6042
0	0.33		0.6881
0	1.21		4.2779
0	1.71		8.6740
0	1.55		7.2221
0	1.67		8.3729
0	8.93	9	4.7253
0	15.59	16	4.5003
0	14.02	14	17.2974
0	3.43		7.2939
0	4.97		15.5821
0	4.47		10.8543
0	5.05		15.0979
0	3.84		1.8386
0	5.48		3.9668

RCAF	11	11.34	11.34	11.34	7.94	13.23	6.61	11.34	0.0	0.0
USAF		15.87	15.87	22.68	15.87	22.68	15.87	15.87	0.0	0.0
LETTER		12.44	20.29	13.70	14.10	18.86	18.86	14.96	0.0	0.0
IDN 1		1.64	0.62	3.03	0.66	2.36	0.61	3.95	0.0	0.0
IDN 2		2.24	0.76	4.42	0.81	3.26	0.74	5.90	0.0	0.0
IDN 3		2.07	0.72	4.15	0.77	3.02	0.69	5.48	0.0	0.0
IDN 4		2.24	0.77	4.46	0.82	3.26	0.73	5.95	0.0	0.0
REC 1		3.21	0.49	3.24	1.01	2.34	1.59	3.21	0.0	0.0
REC 2		4.57	0.63	4.51	1.47	3.39	2.33	4.57	0.0	0.0
REC 3		4.28	0.60	4.27	1.36	3.16	2.16	4.28	0.0	0.0
REC 4		4.56	0.64	4.52	1.48	3.39	2.32	4.56	0.0	0.0
RCAF	12	7.94	11.34	9.92	7.94	9.92	11.34	11.34	0.0	0.0
USAF		15.87	15.87	15.87	15.87	19.84	15.87	26.46	0.0	0.0
LETTER		18.78	18.50	17.39	16.52	20.18	21.84	21.84	0.0	0.0
IDN 1		1.24	4.55	2.17	2.16	4.92	3.96	3.04	0.0	0.0
IDN 2		1.37	7.36	3.18	3.19	7.98	6.03	4.40	0.0	0.0
IDN 3		1.38	6.59	2.97	2.97	7.17	5.54	4.04	0.0	0.0
IDN 4		1.45	7.39	3.32	3.30	8.06	6.08	4.46	0.0	0.0
REC 1		1.67	5.36	2.44	4.21	6.68	4.22	3.23	0.0	0.0
REC 2		2.50	8.23	3.72	6.38	10.05	6.48	4.97	0.0	0.0
REC 3		2.26	7.43	3.31	5.86	9.17	5.88	4.42	0.0	0.0
REC 4		2.44	8.16	3.56	6.43	10.00	6.47	4.82	0.0	0.0
RCAF	13	6.61	6.61	5.67	7.94	7.94	7.94	7.94	7.94	0.0
USAF		13.23	11.34	11.34	15.87	15.87	13.23	11.34	13.23	0.0
LETTER		12.81	13.35	13.45	11.71	16.24	15.77	11.82	11.91	0.0
IDN 1		1.57	1.86	1.71	1.83	1.45	2.58	0.18	1.93	0.0
IDN 2		2.07	2.32	2.22	2.22	1.60	3.53	0.18	2.47	0.0
IDN 3		2.02	2.21	2.12	2.15	1.57	3.24	0.18	2.33	0.0
IDN 4		2.19	2.40	2.30	2.31	1.67	3.60	0.16	2.53	0.0
REC 1		1.84	2.67	1.81	2.49	2.67	3.58	0.62	2.96	0.0
REC 2		2.76	4.06	2.75	3.74	4.03	5.58	0.74	4.66	0.0
REC 3		2.49	3.60	2.47	3.50	3.58	4.92	0.69	4.10	0.0
REC 4		2.68	3.92	2.67	3.84	3.89	5.37	0.69	4.50	0.0
RCAF	14	9.02	11.28	9.02	9.02	9.02	12.89	11.28	0.0	0.0
USAF		15.04	22.56	18.05	22.56	15.04	25.78	22.56	0.0	0.0
LETTER		21.85	25.99	21.81	24.10	24.62	21.55	22.86	0.0	0.0
IDN 1		5.88	4.39	4.75	4.48	5.88	2.46	1.65	0.0	0.0
IDN 2		9.06	6.48	6.96	6.57	9.07	3.15	1.98	0.0	0.0
IDN 3		7.75	5.79	6.27	5.89	7.75	2.91	1.93	0.0	0.0
IDN 4		8.79	6.48	7.12	6.59	8.79	3.16	2.08	0.0	0.0
REC 1		9.29	9.29	5.50	6.11	7.64	2.19	3.30	0.0	0.0
REC 2		14.09	14.09	8.49	9.10	11.32	3.42	4.95	0.0	0.0
REC 3		12.40	12.40	7.41	8.22	10.10	2.96	4.61	0.0	0.0
REC 4		14.00	14.00	8.32	9.22	11.31	3.31	5.21	0.0	0.0
RCAF	15	18.05	11.28	11.28	12.89	12.89	12.89	22.56	0.0	0.0
USAF		25.78	22.56	18.05	22.56	25.78	25.78	30.08	0.0	0.0
LETTER		25.28	22.66	24.01	23.78	24.36	24.69	28.07	0.0	0.0
IDN 1		2.98	7.23	4.19	5.54	13.38	3.02	3.29	0.0	0.0
IDN 2		4.21	10.91	5.80	8.00	20.64	4.30	4.35	0.0	0.0
IDN 3		3.85	9.30	5.20	7.11	17.02	3.91	3.94	0.0	0.0
IDN 4		4.30	10.46	5.77	7.88	20.64	4.36	4.38	0.0	0.0
REC 1		4.61	7.70	7.70	6.24	9.29	4.70	3.42	0.0	0.0
REC 2		6.95	11.33	11.33	9.16	14.09	7.07	5.09	0.0	0.0
REC 3		6.15	10.16	10.16	8.33	12.40	6.26	4.52	0.0	0.0
REC 4		6.80	11.32	11.32	9.34	14.00	6.92	4.95	0.0	0.0

10.45	10	31.9100
17.82	18	66.1262
16.17	16	57.2483
1.84		10.6051
2.59		24.8034
2.41		21.3882
2.60		25.2542
2.16		7.8164
3.07		15.7059
2.87		13.9408
3.07		15.6325
9.96	10	13.8911
17.95	18	97.5059
19.29	19	25.9411
3.15		11.3356
4.79		35.3656
4.38		27.1415
4.87		34.6622
3.97		17.5620
6.05		40.2424
5.48		33.8743
5.98		40.9931
7.32	7	5.6253
13.18	13	24.6979
13.38	13	21.6000
1.64		3.2189
2.08		6.1864
1.98		5.2480
2.14		6.5310
2.33		5.6308
3.54		15.0348
3.17		11.4629
3.44		14.1997
10.22	10	15.1043
20.23	20	105.7464
23.25	23	17.1332
4.21		15.5925
6.18		44.3281
5.47		30.3453
6.14		40.6902
6.19		46.1982
9.35		104.1633
8.30		79.8107
9.34		101.8328
14.55	15	106.0267
24.37	24	85.1063
24.61	25	17.5948
5.66		83.9868
8.32		213.8284
7.19		137.6172
8.26		210.4255
6.24		26.5990
9.29		59.4265
8.28		46.8821

RCAF 16	9.02	7.52	9.02	12.89	12.89	11.28	9.02	0.0	0.
USAF	15.04	15.04	18.05	15.04	22.56	22.56	22.56	0.0	0.
LETTER	16.94	15.69	19.11	18.30	22.92	19.27	20.60	0.0	0.
IDN 1	9.43	3.92	3.84	9.43	4.08	6.86	2.15	0.0	0.
IDN 2	14.24	5.63	5.55	14.24	5.44	9.77	2.68	0.0	0.
IDN 3	12.25	5.18	5.09	12.25	5.03	8.72	2.54	0.0	0.
IDN 4	14.17	5.80	5.67	14.17	5.53	9.78	2.76	0.0	0.
REC 1	7.83	6.44	6.41	9.55	7.83	3.66	5.25	0.0	0.
REC 2	11.92	9.32	9.36	14.71	11.92	5.06	7.46	0.0	0.
REC 3	10.52	8.52	8.51	12.84	10.52	4.80	6.92	0.0	0.
REC 4	11.87	9.46	9.47	14.59	11.87	5.22	7.55	0.0	0.
RCAF 17	12.89	12.89	12.89	12.89	12.89	12.89	9.02	0.0	0.
USAF	25.78	22.56	22.56	22.56	22.56	25.78	18.05	0.0	0.
LETTER	16.22	17.45	18.63	18.44	21.54	20.21	16.16	0.0	0.
IDN 1	4.92	8.77	6.62	8.82	8.77	3.79	3.87	0.0	0.
IDN 2	6.77	12.77	10.05	13.21	12.77	5.02	5.08	0.0	0.
IDN 3	6.25	11.23	8.80	11.44	11.23	4.67	4.72	0.0	0.
IDN 4	6.86	12.82	10.19	13.18	12.82	5.12	5.22	0.0	0.
REC 1	6.33	9.34	9.34	9.34	7.72	5.00	6.39	0.0	0.
REC 2	9.13	14.03	14.03	14.03	11.34	6.97	9.23	0.0	0.
REC 3	8.33	12.36	12.36	12.36	10.18	6.51	8.34	0.0	0.
REC 4	9.23	13.90	13.90	13.90	11.34	7.05	9.22	0.0	0.
RCAF 18	17.19	20.05	30.08	20.05	20.05	15.04	24.06	0.0	0.
USAF	24.06	30.08	34.38	30.08	24.06	24.06	34.38	0.0	0.
LETTER	31.31	35.59	33.94	28.60	33.50	31.31	30.04	0.0	0.
IDN 1	2.75	0.01	9.69	5.46	2.77	11.58	3.99	0.0	0.
IDN 2	4.36	0.04	14.60	8.50	4.32	17.12	6.24	0.0	0.
IDN 3	3.93	0.03	13.43	7.69	3.92	15.84	5.64	0.0	0.
IDN 4	4.37	0.03	14.60	8.51	4.32	17.11	6.25	0.0	0.
REC 1	4.13	0.68	7.24	7.30	5.57	10.98	7.25	0.0	0.
REC 2	6.35	0.99	10.98	11.02	8.51	16.02	10.73	0.0	0.
REC 3	5.78	0.89	10.07	10.12	7.78	14.95	9.94	0.0	0.
REC 4	6.36	0.98	11.01	11.06	8.54	16.09	10.78	0.0	0.
RCAF 19	15.04	15.04	15.04	17.19	17.19	17.19	17.19	17.19	0.
USAF	24.06	30.08	24.06	30.08	34.38	34.38	30.08	34.38	0.
LETTER	28.27	28.28	26.91	28.82	27.73	28.36	26.76	25.47	0.
IDN 1	2.48	3.27	0.29	1.74	2.64	4.41	10.47	0.87	0.
IDN 2	3.46	5.24	0.29	2.12	3.74	7.09	15.57	1.01	0.
IDN 3	3.10	4.72	0.29	1.98	3.36	6.39	14.39	0.98	0.
IDN 4	3.39	5.33	0.28	2.08	3.68	7.20	15.58	0.99	0.
REC 1	3.64	4.75	3.67	3.66	3.71	8.26	8.57	2.35	0.
REC 2	5.69	7.59	5.71	5.71	5.69	12.64	13.08	3.55	0.
REC 3	5.21	6.85	5.22	5.23	5.10	11.55	11.97	3.20	0.
REC 4	5.80	7.68	5.81	5.81	5.53	12.68	13.14	3.44	
RCAF 20	8.59	8.59	8.59	8.59	7.29	8.59	8.59	0.0	0.
USAF	13.37	17.19	15.04	17.19	13.37	15.04	17.19	0.0	0.
LETTER	15.75	14.89	14.81	13.49	14.84	15.10	14.14	0.0	0.
IDN 1	0.73	0.73	0.73	0.0	-0.14	-0.04	0.41	0.0	0.
IDN 2	0.64	0.64	0.64	0.0	-0.14	-0.04	0.47	0.0	0.
IDN 3	0.75	0.75	0.75	0.0	-0.15	-0.04	0.44	0.0	0.
IDN 4	0.78	0.78	0.78	0.0	-0.15	-0.04	0.46	0.0	0.
REC 1	0.06	1.52	0.24	1.19	0.05	0.00	-0.04	0.0	0.
REC 2	0.00	1.84	0.19	1.51	0.06	0.01	-0.03	0.0	0.
		1.80	0.28	1.39	0.03	-0.00	-0.02	0.0	0.
		1.89	0.29	1.46	0.03	-0.00	-0.01	0.0	0.

10.24	10	26.9741
18.69	19	85.3041
18.98	19	33.7106
5.67		50.9890
8.22		127.1565
7.30		88.2991
8.27		122.5460
6.71		22.1709
9.96		61.2720
8.95		41.7600
10.00		57.5179
12.34	12	12.8194
22.84	23	40.5946
18.38	18	23.8685
6.51		32.4432
9.38		82.4215
8.33		57.4974
9.46		80.4651
7.64		18.8557
11.25		50.1136
10.06		34.4532
11.22		46.9433
20.93	21	144.5299
28.73	29	132.7305
32.04	32	35.1990
5.18		101.1438
7.88		220.0882
7.21		189.0753
7.88		219.9340
6.16		61.3982
9.23		131.4021
8.50		114.5309
9.26		132.7083
16.38	16	8.6550
30.19	30	127.6793
27.57	28	8.7056
3.27		71.0633
4.81		166.1530
4.40		141.0095
4.82		167.9877
4.83		37.2944
7.46		86.1155
6.79		72.5890
7.49		87.6105
8.41	8	1.4533
15.48	15	18.0571
14.72	15	3.1028
0.34		0.9546
0.31		0.7689
0.36		1.0113
0.37		1.0857
0.43		2.4838
		2.8622

RCAF 21	6.45	9.02	7.52	9.02	5.47	15.04	9.02	0.0	0.
USAF	15.04	15.04	15.04	15.04	11.28	18.05	18.05	0.0	0.
LETTER	12.14	12.83	14.37	12.38	12.28	12.62	14.28	0.0	0.
IDN 1	0.45	5.39	0.83	1.64	-0.07	-0.07	0.40	0.0	0.
IDN 2	0.55	8.26	1.09	2.10	-0.07	-0.07	0.43	0.0	0.
IDN 3	0.52	7.53	1.00	2.01	-0.07	-0.07	0.45	0.0	0.
IDN 4	0.55	8.28	1.07	2.10	-0.07	-0.07	0.47	0.0	0.
REC 1	1.69	3.70	3.34	2.47	-0.00	0.80	5.24	0.0	0.
REC 2	2.58	5.35	5.14	3.71	0.02	0.96	7.26	0.0	0.
REC 3	2.36	5.02	4.76	3.46	0.01	0.91	6.91	0.0	0.
REC 4	2.58	5.39	5.25	3.78	0.02	0.91	7.29	0.0	0.
RCAF 22	7.52	7.52	7.52	7.52	7.52	9.02	7.52	7.52	0.
USAF	12.89	12.89	12.89	18.05	18.05	18.05	12.89	11.28	0.
LETTER	11.48	10.91	11.79	12.11	11.82	14.28	12.98	11.50	0.
IDN 1	0.52	-0.01	-0.02	-0.02	-0.05	0.90	1.27	0.43	0.
IDN 2	0.51	-0.01	-0.02	-0.02	-0.05	1.05	1.49	0.54	0.
IDN 3	0.51	-0.01	-0.02	-0.02	-0.05	0.99	1.47	0.49	0.
IDN 4	0.50	-0.01	-0.02	-0.02	-0.05	1.01	1.53	0.52	0.
REC 1	0.97	0.00	0.48	0.47	0.31	1.40	0.62	0.05	0.
REC 2	1.24	0.03	0.54	0.53	0.34	2.09	0.70	0.12	0.
REC 3	1.17	0.02	0.52	0.51	0.32	1.89	0.72	0.08	0.
REC 4	1.21	0.03	0.53	0.51	0.32	2.01	0.74	0.10	0.
RCAF 23	12.89	9.02	7.52	11.28	11.28	12.89	5.47	0.0	0.
USAF	22.56	18.05	15.04	15.04	15.04	22.56	15.04	0.0	0.
LETTER	15.57	14.02	16.56	15.91	14.60	17.81	15.73	0.0	0.
IDN 1	2.75	1.91	1.03	2.13	2.97	0.13	2.06	0.0	0.
IDN 2	3.77	2.29	1.27	2.59	4.14	0.14	2.54	0.0	0.
IDN 3	3.38	2.18	1.24	2.41	3.71	0.13	2.39	0.0	0.
IDN 4	3.72	2.31	1.31	2.51	4.07	0.14	2.53	0.0	0.
REC 1	2.19	2.21	3.36	5.95	3.25	2.10	1.56	0.0	0.
REC 2	3.28	3.29	5.04	8.86	4.88	3.17	2.32	0.0	0.
REC 3	3.00	3.03	4.66	8.16	4.51	2.85	2.11	0.0	0.
REC 4	3.24	3.37	5.10	8.86	4.94	3.06	2.31	0.0	0.
RCAF 24	7.52	9.02	9.02	9.02	7.52	5.47	11.28	0.0	0.
USAF	15.04	18.05	18.05	15.04	15.04	12.89	18.05	0.0	0.
LETTER	13.26	12.76	17.64	13.36	15.68	13.85	14.44	0.0	0.
IDN 1	-0.01	0.69	2.98	1.22	0.47	1.85	-0.01	0.0	0.
IDN 2	-0.01	0.64	3.91	1.29	0.53	2.10	-0.01	0.0	0.
IDN 3	-0.01	0.64	3.53	1.24	0.54	1.99	-0.01	0.0	0.
IDN 4	-0.01	0.62	3.79	1.25	0.58	2.05	-0.01	0.0	0.
REC 1	1.46	2.21	2.26	3.41	3.67	2.46	1.06	0.0	0.
REC 2	2.09	3.22	3.23	4.94	5.44	3.60	1.31	0.0	0.
REC 3	1.90	2.99	2.98	4.51	5.05	3.29	1.23	0.0	0.
REC 4	2.03	3.32	3.14	4.78	5.50	3.49	1.27	0.0	0.
RCAF 25	9.02	9.02	9.02	9.02	5.47	9.02	9.02	7.52	0.
USAF	15.04	15.04	15.04	15.04	12.89	15.04	15.04	15.04	0.
LETTER	10.76	12.10	13.69	12.05	12.45	12.89	12.51	12.76	0.
IDN 1	0.65	1.99	0.62	0.70	1.71	0.62	-0.05	-0.04	0.
IDN 2	0.60	2.37	0.56	0.64	2.18	0.57	-0.05	-0.04	0.
IDN 3	0.61	2.26	0.57	0.65	2.06	0.58	-0.05	-0.04	0.
IDN 4	0.58	2.37	0.54	0.63	2.20	0.55	-0.05	-0.04	0.
REC 1	1.53	3.48	2.27	2.43	2.56	5.81	1.33	1.52	0.
		5.01	3.23	3.47	3.69	8.41	1.89	2.32	0.
		4.72	3.02	3.20	3.42	7.73	1.71	2.08	0.
REC 4	2.17	5.07	3.31	3.39	3.76	8.18	1.81	2.25	0.

8.79	9	57.3596
15.36	15	31.5043
12.99	13	5.3259
1.23		22.3164
1.76		52.7348
1.63		43.6826
1.76		52.9569
2.46		19.4524
3.57		39.5878
3.35		35.5069
3.60		40.6868
[redacted]		
7.71	8	1.9791
14.62	15	58.3565
12.11	12	7.8478
0.38		1.7367
0.44		2.3497
0.42		2.2372
0.43		2.3715
0.54		1.5337
0.70		3.1999
0.65		2.6603
0.68		2.9909
10.35	10	47.6081
17.62	18	75.6104
15.74	16	9.2689
1.85		5.8353
2.39		11.3268
2.21		8.9619
2.37		10.8641
2.95		13.0113
4.41		28.8709
4.04		24.8298
4.43		28.9943
8.41	8	19.5996
16.02	16	25.0056
14.43	14	17.5337
1.03		7.0940
1.21		11.8473
1.13		9.6619
1.18		11.0814
2.36		5.3661
3.41		12.6919
3.13		10.7754
3.36		12.7909
[redacted]		
8.39	8	11.6995
14.77	15	4.0390
12.40	12	4.9334
0.77		3.7622
0.85		5.9652
0.83		5.2987
0.85		6.0382
2.61		15.1374

RCAF	26	7.52	9.02	6.45	9.02	9.02	9.02	7.52	C.0	0.0
USAF		12.89	15.04	15.04	15.04	12.89	15.04	12.89	C.0	0.0
LETTER		14.05	16.16	13.53	14.48	16.45	15.04	12.75	C.0	0.0
IDN 1		C.61	0.57	0.82	C.57	2.82	0.75	-0.04	C.0	0.0
IDN 2		C.57	0.52	0.83	0.52	3.74	0.90	-0.04	C.C	0.0
IDN 3		C.58	0.53	0.81	0.53	3.37	0.83	-0.04	C.0	0.
IDN 4		C.56	0.51	0.80	0.51	3.68	C.87	-0.04	C.C	0.
REC 1		1.58	0.26	3.15	3.15	4.01	0.13	2.45	C.C	0.0
REC 2		2.20	0.26	4.49	4.45	5.92	0.21	3.56	C.0	0.0
REC 3		2.03	0.26	4.14	4.13	5.51	0.17	3.25	C.0	0.0
REC 4		2.15	0.24	4.34	4.31	5.98	0.19	3.44	C.C	0.0
RCAF	27	8.77	7.02	7.02	7.02	7.02	7.02	11.70	C.0	0.
USAF		14.04	11.70	11.70	17.55	14.04	14.04	17.55	0.0	0.0
LETTER		12.10	12.70	11.09	11.48	15.17	11.08	12.83	C.C	0.
IDN 1		1.57	1.06	2.27	2.22	C.95	2.21	1.01	0.0	0.
IDN 2		2.12	1.30	3.30	3.23	1.17	3.21	1.34	C.C	0.0
IDN 3		1.99	1.25	3.04	2.97	1.10	2.96	1.25	0.0	0.0
IDN 4		2.11	1.31	3.25	3.17	1.15	3.15	1.32	0.0	0.
REC 1		2.71	3.93	2.09	2.71	4.05	2.71	2.42	0.0	0.0
REC 2		3.76	5.52	3.00	3.76	5.72	3.76	3.50	C.C	0.0
REC 3		3.61	5.26	2.84	3.61	5.43	3.61	3.23	0.0	0.0
REC 4		3.84	5.60	3.06	3.84	5.79	3.84	3.43	0.0	0.0
RCAF	28	8.77	4.25	8.77	8.77	14.04	17.55	8.77	0.0	0.0
USAF		14.04	10.03	17.55	17.55	23.39	23.39	14.04	0.0	0.0
LETTER		12.29	11.96	17.18	14.27	18.11	15.84	13.75	C.C	0.0
IDN 1		2.24	2.15	2.95	2.96	3.85	2.99	2.96	0.0	0.0
IDN 2		3.33	3.18	4.49	4.53	5.97	4.59	4.49	0.0	0.0
IDN 3		3.03	2.94	4.07	4.09	5.35	4.14	4.09	0.0	0.0
IDN 4		3.28	3.17	4.40	4.44	5.83	4.49	4.44	C.C	0.0
REC 1		3.24	3.75	3.27	4.62	1.80	5.71	2.59	0.0	0.0
REC 2		4.92	5.30	4.91	6.76	2.65	8.41	3.82	0.0	0.0
REC 3		4.57	5.04	4.57	6.35	2.52	7.86	3.59	C.0	0.0
REC 4		5.01	5.42	5.00	6.86	2.74	8.51	3.92	C.C	0.0
RCAF	29	7.94	9.52	6.80	5.95	6.80	9.52	3.97	C.C	0.0
USAF		11.91	15.87	11.91	11.91	11.91	15.87	9.52	0.0	0.0
LETTER		12.29	12.41	9.44	11.03	12.71	11.10	11.77	0.0	0.0
IDN 1		1.09	2.16	1.19	1.15	2.20	2.17	1.12	0.0	0.0
IDN 2		1.41	3.40	1.57	1.55	3.47	3.43	1.48	C.C	0.0
IDN 3		1.37	3.02	1.50	1.47	3.08	3.07	1.42	C.C	0.0
IDN 4		1.49	3.51	1.63	1.61	3.59	3.53	1.55	0.0	0.0
REC 1		1.03	2.94	1.05	2.12	2.10	2.88	1.62	C.0	0.0
REC 2		1.52	4.46	1.60	3.28	3.22	4.38	2.52	C.C	0.0
REC 3		1.39	4.01	1.43	2.96	2.92	3.97	2.25	C.0	0.0
REC 4		1.52	4.52	1.56	3.35	3.31	4.43	2.52	C.0	0.0
RCAF	30	9.52	11.91	7.94	9.52	9.52	5.95	9.52	0.0	0.0
USAF		13.61	15.87	13.61	15.87	13.61	11.91	13.61	0.0	0.0
LETTER		10.36	13.25	11.60	14.01	10.40	11.87	13.96	C.C	0.0
IDN 1		2.28	5.30	1.67	3.14	3.76	3.44	2.76	C.0	0.0
IDN 2		3.58	7.78	2.51	4.55	5.79	5.14	4.31	0.0	0.0
IDN 3		3.25	7.18	2.33	4.11	5.04	4.55	3.85	C.0	0.0
IDN 4		3.73	7.89	2.70	4.72	5.88	5.34	4.39	C.C	0.0
REC 1		3.76	4.67	3.00	3.00	4.67	2.78	2.23	0.0	0.0
REC 2			6.81	4.31	4.38	6.81	4.13	3.40	C.0	0.0
REC 3			6.14	3.96	3.99	6.14	3.75	3.03	0.0	0.0
REC 4			6.83	4.37	4.44	6.83	4.21	3.35	C.C	0.0

8.23	8	6.7130
14.12	14	7.9132
14.64	15	10.9061
0.87		4.8948
1.00		9.2492
0.94		7.3559
0.99		9.0043
2.10		13.4736
3.01		29.0705
2.78		25.0755
2.95		28.7712
7.94	8	19.0582
14.37	14	34.7934
12.35	12	12.3220
1.61		2.2751
2.24		5.8875
2.08		4.8298
2.21		5.6301
2.95		3.3673
4.15		6.5707
3.94		5.9808
4.20		6.7869
10.13	10	112.1587
17.14	17	148.4365
14.77	15	33.5169
2.87		1.9258
4.37		5.1551
3.96		3.8885
4.29		4.7345
3.57		9.9893
5.25		21.3201
4.93		18.4890
5.35		21.3590
7.22	7	23.6631
12.70	13	32.7620
11.54	12	7.5779
1.58		1.8519
2.33		6.3897
2.13		4.4841
2.42		6.7033
1.96		3.6548
3.00		8.5310
2.70		6.9732
3.03		9.0692
9.13	9	19.8462
14.01	14	12.0313
12.21	12	14.5979
3.19		8.1446
4.81		17.0281
4.33		14.0963
4.95		16.6353
3.45		5.4185
5.05		10.9950
4.57		8.8481

TABLE 6

REGRESSION ANALYSIS

CODE NO	COEFFICIENTS B0	B1	B2	CALC F LACK FIT	SYX	R	ERROR	DF	SUM Y SUM X	
CURVE 1111	-2.619	0.694	-0.017	2.664	1.381	0.5960	22.074	18	72.7	4
LINE	-0.417	0.285		2.596	1.387	0.5960			2	.
CURVE 2111	-3.451	0.922	-0.021	2.834	2.140	0.5783	51.172	18	103.0	3
LINE	-0.740	0.419		2.680	2.133	0.5783			2	.
CURVE 3111	-3.017	0.819	-0.018	2.643	1.853	0.5963	39.952	18	94.10	5
LINE	-0.651	0.380		2.505	1.847	0.5963			2	.
CURVE 4111	-3.456	0.930	-0.021	2.729	2.144	0.5766	52.495	18	104.03	1
LINE	-0.697	0.418		2.587	2.137	0.5766			2	.
CURVE 1121	-2.232	0.764	-0.018	1.677	1.450	0.6162	30.896	18	99.93	3
LINE	0.177	0.316		1.678	1.460	0.6162			2	.
CURVE 2121	-3.271	1.111	-0.026	1.701	2.189	0.6169	69.898	18	146.9	7
LINE	0.142	0.477		1.681	2.197	0.6169			2	.
CURVE 3121	-2.887	0.997	-0.023	1.636	1.935	0.6273	55.640	18	133.99	6
LINE	0.145	0.434		1.621	1.943	0.6273			2	.
CURVE 4121	-3.244	1.107	-0.026	1.705	2.201	0.6120	70.622	18	146.54	2
LINE	0.165	0.474		1.683	2.209	0.6120			2	.
CURVE 1211	-3.373	0.460	-0.007	4.163	1.326	0.6429	8.657	13	72.79	4
LINE	-1.168	0.209		4.044	1.324	0.6429			5	.
CURVE 2211	-4.588	0.619	-0.008	3.837	2.056	0.6252	22.238	13	103.00	3
LINE	-1.855	0.308		3.676	2.040	0.6252			5	.
CURVE 3211	-4.016	0.550	-0.007	3.557	1.786	0.6375	17.829	13	94.10	5
LINE	-1.610	0.277		3.412	1.773	0.6375			5	.
CURVE 4211	-4.573	0.622	-0.008	3.563	2.064	0.6220	23.776	13	104.03	1
LINE	-1.797	0.307		3.417	2.049	0.6220			5	.
CURVE 1221	-2.635	0.452	-0.006	3.728	1.369	0.6797	10.093	13	99.93	3
LINE	-0.746	0.238		3.579	1.360	0.6797			5	.
CURVE 2221	-3.671	0.631	-0.007	3.775	2.053	0.6858	22.460	13	146.91	7
LINE	-1.298	0.361		3.594	2.032	0.6858			5	.
CURVE 3221	-3.309	0.574	-0.007	3.564	1.820	0.6912	18.493	13	133.99	6
LINE	-1.114	0.325		3.400	1.803	0.6912			5	.
CURVE 4221	-3.675	0.632	-0.007	3.876	2.065	0.6814	22.258	13	146.54	2
LINE	-1.274	0.359		3.691	2.045	0.6814			5	.
CURVE 1311	-2.758	0.431	-0.006	0.586	1.299	0.6580	31.038	15	72.7	4
LINE	-0.751	0.195		0.609	1.301	0.6580			4	.
CURVE 2311	-3.596	0.562	-0.007	0.576	2.014	0.6439	75.022	15	103.0	3
LINE	-1.272	0.289		0.569	2.000	0.6439			4	.
		.502	-0.006	0.552	1.745	0.6576	57.031	15	94.10	5
LINE	-1.003	0.269		0.548	1.734	0.6576			4	.

PARTIAL SUM AND VARIANCES

	SUM YY / SUM XX	SUM XY / SUM XXX	SUM XXY / SUM XXXX	VAR X / VAR Y
4	260.2441	829.6416	10506.2188	30.5779
.	3345.	42221.	597741.	17.5421
3	545.0198	1179.4287	15026.8125	30.5779
.	3345.	42221.	597741.	41.9048
5	443.4819	1076.6497	13713.9414	30.5779
.	3345.	42221.	597741.	32.2778
1	552.4077	1189.3564	15130.3125	30.5779
.	3345.	42221.	597741.	41.1794
3	429.1548	1111.5234	13795.7891	30.5779
.	3345.	42221.	597741.	15.7678
7	937.6875	1638.3464	20394.6016	30.5779
.	3345.	42221.	597741.	34.5688
6	772.8003	1493.6812	18592.2500	30.5779
.	3345.	42221.	597741.	28.5573
2	934.3267	1633.3696	20322.1719	30.5779
.	3345.	42221.	597741.	34.1928
4	260.2441	1414.6814	29451.4805	48.7441
.	9629.	195527.	4287149.	17.5421
3	545.0198	2011.0110	42071.8281	48.7441
.	9629.	195527.	4287149.	41.9048
5	443.4819	1833.4285	38299.6758	48.7441
.	9629.	195527.	4287149.	32.2778
1	552.4077	2027.6174	42356.5078	48.7441
.	9629.	195527.	4287149.	41.1794
3	429.1548	1902.7861	39048.5273	48.7441
.	9629.	195527.	4287149.	15.7678
7	937.6875	2806.4260	57801.5195	48.7441
.	9629.	195527.	4287149.	34.5688
6	772.8003	2556.4077	52592.0937	48.7441
.	9629.	195527.	4287149.	28.5573
2	934.3267	2798.4358	57616.7148	48.7441
.	9629.	195527.	4287149.	34.1928
4	260.2441	1372.2156	28432.4570	17.5808
.	8923.	181743.	4085263.	17.5421
3	545.0198	1953.8210	40771.3203	17.5808
.	8923.	181743.	4085263.	41.9048

CURVE 4311	-3.613	0.570	-0.007	0.578	2.023	0.6402	75.572	15	104.01	55
LINE	-1.213	0.287		0.573	2.010	0.6402			40.	
CURVE 1321	-2.347	0.464	-0.006	0.734	1.323	0.6993	29.785	15	99.93	42
LINE	-0.292	0.222		0.752	1.325	0.6993			40.	
CURVE 2321	-3.439	0.671	-0.009	0.732	1.980	0.7061	66.736	15	146.47	93
LINE	-0.613	0.338		0.738	1.977	0.7061			40.	
CURVE 3321	-2.987	0.597	-0.008	0.702	1.755	0.7120	53.242	15	133.916	77
LINE	-0.499	0.305		0.709	1.752	0.7120			40.	
CURVE 4321	-3.364	0.662	-0.009	0.705	1.996	0.7011	68.795	15	146.582	93
LINE	-0.589	0.336		0.709	1.992	0.7011			40.	

1	552.4077	1969.2073	41013.1797	17.5808
.	8923.	181743.	4085263.	41.1794
3	429.1548	1840.6633	37490.8945	17.5808
.	8923.	181743.	4085263.	15.7678
7	937.6875	2716.5720	55549.7266	17.5808
.	8923.	181743.	4085263.	34.5688
6	772.8003	2474.1633	50544.4961	17.5808
.	8923.	181743.	4085263.	28.5573
2	934.3267	2708.4717	55368.2812	17.5808
.	8923.	181743.	4085263.	34.1928

TABLE 1

TRAINED OBSERVERS

MODEL GIVEN	NOT READ	MODEL READ 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	37	28	0	0	1	0	9	4	0	0	0	0	0	0	0	0	1	0
2	39	0	9	0	12	0	0	0	0	0	0	0	0	0	0	0	0	1
3	23	3	0	2	0	0	0	0	0	1	0	2	1	1	0	0	2	0
4	34	0	0	0	18	0	0	1	0	0	0	1	0	1	0	0	0	0
5	23	0	0	0	0	18	0	0	0	0	0	0	0	1	2	0	0	0
6	51	0	0	0	4	0	10	1	0	1	0	0	1	5	2	0	0	1
7	15	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0
8	23	0	0	0	0	0	0	1	60	0	0	0	0	0	4	0	0	1
9	20	0	0	0	0	1	3	5	0	26	0	3	0	0	1	0	0	0
10	5	0	0	0	0	0	0	0	0	0	84	1	0	0	0	0	0	0
11	19	0	0	0	0	0	0	1	2	0	3	50	0	0	0	0	0	0
12	28	1	0	0	0	0	0	0	0	0	0	0	13	1	1	0	0	0
13	56	0	0	1	2	0	0	1	0	0	0	0	1	9	1	0	0	0
14	18	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0
15	46	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	0	0
16	46	1	0	0	0	0	1	0	0	0	0	0	7	0	0	0	2	0
17	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25
18	33	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	1
19	29	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
20	42	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
21	44	0	0	0	0	0	0	0	0	0	4	0	3	0	0	0	1	0
22	66	0	0	0	0	0	0	0	0	0	1	1	0	0	1	31	0	0
23	39	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
24	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	40	0	0	3	0	0	0	3	0	0	0	0	0	0	1	0	0	0

TABLE 2

LETTER GIVEN	NOT READ	LETTER READ 1	2	3	4	5	6	7
1	108	302	0	15	25	15	45	10
2	115	4	358	21	26	4	3	9
3	145	14	11	350	6	22	4	3
4	123	7	4	7	360	1	32	6
5	128	46	3	86	5	269	8	35
6	127	12	4	10	57	4	318	23
7	67	12	8	13	12	21	31	296

TABLE 3

MODREC GIVEN	NOT READ	MODREC 1	2	3	4
1	22	139		0	1
2	98	7	7	23	14
3	83	2	4	24	22
4	171	3	1	8	204
5	27	0		0	10
6	48	1		19	21

16	17	18	19	20	21	22	23	24	25
1	0	0	8	0	0	0	0	0	2
0	1	0	0	0	0	1	0	3	0
2	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	3	1
0	0	0	0	0	0	0	0	0	1
0	1	0	0	0	4	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	1
0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0	0	0
0	0	0	0	1	1	1	0	0	1
0	0	0	0	0	0	0	0	0	3
0	0	0	0	0	0	1	0	0	1
2	0	0	0	0	8	0	0	0	0
0	25	1	0	7	0	3	0	1	0
0	1	8	0	0	0	0	0	0	0
1	0	0	4	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0
1	0	0	1	0	2	0	0	0	0
0	0	0	0	3	0	2	1	2	0
0	0	0	0	0	0	2	1	1	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	7

MODREC READ

3	4	5	6
0	1	2	1
23	14	3	14
24	22	4	33
8	204	6	8
0	10	90	6
19	21	1	48

TABLE 4

LETTER	TOTAL	COR	WRONG	MISSED	PCNT COR	PCNT WR	PCNT MISS	WEIGHT
1	520	302	110	108	58.08	21.15	20.77	0.96
2	540	358	67	115	66.30	12.41	21.30	1.10
3	555	350	60	145	63.06	10.81	26.13	1.04
4	540	360	57	123	66.67	10.56	22.78	1.10
5	580	269	183	128	46.38	31.55	22.07	0.77
6	555	318	110	127	57.30	19.82	22.88	0.95
7	460	296	97	67	64.35	21.09	14.57	1.07
TOTALS	3750	2253	684	813	60.08	18.24	21.68	1.00

MODEL IDENTIFICATION

1	90	28	25	37	31.11	27.78	41.11	1.11
2	65	9	17	39	13.85	26.15	60.00	0.49
3	35	2	10	23	5.71	28.57	65.71	0.20
4	60	18	8	34	30.00	13.33	56.67	1.07
5	45	18	4	23	40.00	8.89	51.11	1.43
6	80	10	19	51	12.50	23.75	63.75	0.44
7	25	10	0	15	40.00	0.0	60.00	1.43
8	90	60	7	23	66.67	7.78	25.56	2.39
9	60	26	14	20	43.33	23.33	33.33	1.55
10	90	84	1	5	93.33	1.11	5.56	3.34
11	75	50	6	19	66.67	8.00	25.33	2.39
12	45	13	4	28	28.89	8.89	62.22	1.03
13	75	9	10	56	12.00	13.33	74.67	0.43
14	45	24	3	18	53.33	6.67	40.00	1.91
15	55	5	4	46	9.09	7.27	83.64	0.32
16	65	2	17	46	3.08	26.15	70.77	0.11
17	90	25	12	53	27.78	13.33	58.89	0.99
18	45	8	4	33	17.78	8.89	73.33	0.63
19	35	4	2	29	11.43	5.71	82.86	0.41
20	45	1	2	42	2.22	4.44	93.33	0.07
21	55	2	9	44	3.64	16.36	80.00	0.13
22	80	2	12	66	2.50	15.00	82.50	0.08
23	45	1	5	39	2.22	11.11	86.67	0.07
24	50	0	0	50	0.0	0.0	100.00	0.0
25	55	7	8	40	12.73	14.55	72.73	0.45
TOTALS	1500	418	203	879	27.87	13.53	58.60	0.90

MODEL RECOGNITION

1	165	139	4	22	84.24	2.42	13.33	1.61
2	235	76	61	98	32.34	25.96	41.70	0.62
3	415	224	108	83	53.98	26.02	20.00	1.03
4	410	204	35	171	49.76	8.54	41.71	0.95
5	135	90	18	27	66.67	13.33	20.00	1.28
6	140	48	44	48	34.29	31.43	34.29	0.65
TOTALS	1500	781	270	449	52.07	18.00	29.93	1.02

TABLE 5

RESOLUTION RESULTS

TARGET TYPE	NEG NO	READER 1	2	3	4	5	6	7	8	9	A
RCAF	1	12.53	15.67	17.90	12.53	17.90	0.0	0.0	0.0	0.0	15
USAF		20.89	20.89	25.07	20.89	25.07	0.0	0.0	0.0	0.0	22
LETTER		17.52	17.45	17.85	15.27	20.54	0.0	0.0	0.0	0.0	17
IDN 1		1.02	2.29	1.73	-0.02	3.07	0.0	0.0	0.0	0.0	1
IDN 2		0.92	2.23	1.68	-0.02	3.30	0.0	0.0	0.0	0.0	1
IDN 3		1.09	2.36	1.86	-0.02	3.36	0.0	0.0	0.0	0.0	1
IDN 4		1.13	2.41	1.90	-0.02	3.46	0.0	0.0	0.0	0.0	1
REC 1		0.37	6.08	2.62	0.94	4.73	0.0	0.0	0.0	0.0	2
REC 2		0.36	8.96	3.85	1.07	7.12	0.0	0.0	0.0	0.0	4
REC 3		0.43	8.37	3.70	1.03	6.60	0.0	0.0	0.0	0.0	4
REC 4		0.46	9.04	4.08	1.03	7.24	0.0	0.0	0.0	0.0	4
RCAF	2	15.67	15.67	20.89	15.67	15.67	0.0	0.0	0.0	0.0	16
USAF		25.07	31.33	25.07	25.07	31.33	0.0	0.0	0.0	0.0	27
LETTER		21.10	23.72	27.32	21.32	27.37	0.0	0.0	0.0	0.0	24
IDN 1		4.37	2.02	5.43	1.57	2.83	0.0	0.0	0.0	0.0	3
IDN 2		4.66	2.16	6.23	1.55	3.03	0.0	0.0	0.0	0.0	3
IDN 3		4.68	2.25	6.03	1.68	3.01	0.0	0.0	0.0	0.0	3
IDN 4		4.81	2.36	6.29	1.72	3.09	0.0	0.0	0.0	0.0	3
REC 1		3.76	2.15	5.17	0.99	2.42	0.0	0.0	0.0	0.0	2
REC 2		5.81	3.18	7.93	1.11	3.73	0.0	0.0	0.0	0.0	4
REC 3		5.27	3.00	7.33	1.13	3.34	0.0	0.0	0.0	0.0	4
REC 4		5.85	3.30	8.15	1.16	3.67	0.0	0.0	0.0	0.0	4
RCAF	3	12.53	15.67	20.89	17.90	20.89	0.0	0.0	0.0	0.0	17
USAF		17.90	17.90	20.89	20.89	25.07	0.0	0.0	0.0	0.0	20
LETTER		19.74	21.32	26.92	18.37	23.73	0.0	0.0	0.0	0.0	22
IDN 1		2.13	4.49	3.61	0.94	5.48	0.0	0.0	0.0	0.0	3
IDN 2		2.02	4.60	3.77	0.83	6.08	0.0	0.0	0.0	0.0	3
IDN 3		2.14	4.68	3.99	0.99	6.00	0.0	0.0	0.0	0.0	3
IDN 4		2.15	4.76	4.11	1.01	6.17	0.0	0.0	0.0	0.0	3
REC 1		3.11	6.10	9.95	0.99	6.46	0.0	0.0	0.0	0.0	5
REC 2		4.53	8.86	13.77	1.08	9.32	0.0	0.0	0.0	0.0	7
REC 3		4.16	8.41	13.20	1.11	8.89	0.0	0.0	0.0	0.0	7
REC 4		4.47	9.11	13.97	1.14	9.61	0.0	0.0	0.0	0.0	7
RCAF	4	8.77	7.02	8.77	7.02	8.77	0.0	0.0	0.0	0.0	8
USAF		14.04	10.03	11.70	11.70	17.55	0.0	0.0	0.0	0.0	13
LETTER		9.42	10.29	12.77	8.01	10.25	0.0	0.0	0.0	0.0	10
IDN 1		-0.03	0.32	0.75	0.0	0.22	0.0	0.0	0.0	0.0	0
IDN 2		-0.02	0.33	0.81	0.0	0.26	0.0	0.0	0.0	0.0	0
IDN 3		-0.03	0.33	0.79	0.0	0.25	0.0	0.0	0.0	0.0	0
IDN 4		-0.02	0.33	0.81	0.0	0.25	0.0	0.0	0.0	0.0	0
REC 1		1.09	0.06	1.60	0.20	0.79	0.0	0.0	0.0	0.0	0
REC 2		1.66	0.06	2.49	0.21	1.05	0.0	0.0	0.0	0.0	1
REC 3		1.53	0.06	2.26	0.21	0.98	0.0	0.0	0.0	0.0	1
REC 4		1.67	0.06	2.50	0.21	1.05	0.0	0.0	0.0	0.0	1
RCAF	5	10.03	7.02	11.70	7.02	10.03	0.0	0.0	0.0	0.0	9
USAF		14.04	14.04	14.04	14.04	14.04	0.0	0.0	0.0	0.0	14
LETTER		14.98	15.20	15.39	13.99	16.02	0.0	0.0	0.0	0.0	15
IDN 1		4.26	2.42	1.84	0.62	4.24	0.0	0.0	0.0	0.0	2
IDN 2		6.58	2.82	2.03	0.59	6.56	0.0	0.0	0.0	0.0	3
IDN 3		6.07	2.81	2.06	0.68	6.05	0.0	0.0	0.0	0.0	3
IDN 4		4.72	2.95	2.14	0.72	6.69	0.0	0.0	0.0	0.0	3

AVG	CODE	VARIATION
15.31	15	29.0104
22.56	23	20.9431
17.72	18	14.0462
1.61		5.5916
1.62		6.3710
1.73		6.5529
1.78		6.9128
2.95		23.7958
4.27		55.8420
4.03		47.4777
4.37		56.6353
16.71	17	21.8157
27.57	28	47.1220
24.17	24	37.8826
3.25		10.5031
3.53		14.6179
3.53		12.9325
3.66		14.0681
2.90		10.3316
4.35		27.2148
4.01		22.4211
4.43		28.4498
17.58	18	51.1288
20.53	21	34.6202
22.02	22	45.9624
3.33		13.1726
3.46		17.2065
3.56		16.0239
3.64		17.0126
5.32		46.9958
7.51		94.4566
7.15		86.5641
7.66		98.4154
8.07	8	3.6944
13.00	13	33.9780
10.15	10	11.9662
0.25		0.3985
0.27		0.4525
0.27		0.4304
0.27		0.4533
0.75		1.6076
1.09		4.1342
1.01		3.3759
1.10		4.1545
9.16	9	17.1119
14.04	14	0.0000
[redacted].12	15	2.1899
2.68		9.9381
3.71		29.6873
3.53		23.5460
3.84		29.8284

		2.18	3.05	2.38	5.13	0.0	0.0	0.0	0.	
REC 4		5.60	2.41	3.38	2.62	5.60	0.0	0.0	0.0	0.)
RCAF	6	7.94	9.92	15.87	15.87	11.34	0.0	0.0	0.0	0.) 1
USAF		15.87	15.87	15.87	19.84	19.84	0.0	0.0	0.0	0.) 1
LETTER		12.58	14.91	15.55	12.64	16.19	0.0	0.0	0.0	0.) 1
IDN 1		1.90	1.29	3.25	1.31	3.28	0.0	0.0	0.0	0.
IDN 2		1.85	1.19	3.65	1.21	3.68	0.0	0.0	0.0	0.)
IDN 3		2.07	1.38	3.65	1.40	3.69	0.0	0.0	0.0	0.)
IDN 4		2.13	1.43	3.81	1.45	3.84	0.0	0.0	0.0	0.)
REC 1		1.28	0.63	2.74	2.46	3.92	0.0	0.0	0.0	0.)
REC 2		1.85	0.82	4.18	3.60	5.81	0.0	0.0	0.0	0.)
REC 3		1.72	0.82	3.92	3.44	5.45	0.0	0.0	0.0	0.)
REC 4		1.87	0.89	4.35	3.76	5.96	0.0	0.0	0.0	0.)
RCAF	7	4.76	5.95	6.80	5.95	5.95	0.0	0.0	0.0	0.)
USAF		7.94	11.91	13.61	9.52	9.52	0.0	0.0	0.0	0.) 1
LETTER		6.75	8.85	11.51	6.84	9.47	0.0	0.0	0.0	0.)
IDN 1		1.90	1.51	0.83	0.39	1.11	0.0	0.0	0.0	0.)
IDN 2		2.37	1.67	0.78	0.35	1.13	0.0	0.0	0.0	0.)
IDN 3		2.35	1.69	0.87	0.41	1.21	0.0	0.0	0.0	0.)
IDN 4		2.50	1.78	0.89	0.43	1.25	0.0	0.0	0.0	0.)
REC 1		1.47	1.02	1.88	0.44	0.68	0.0	0.0	0.0	0.)
REC 2		2.20	1.43	2.74	0.50	0.82	0.0	0.0	0.0	0.)
REC 3		1.97	1.28	2.62	0.50	0.79	0.0	0.0	0.0	0.)
REC 4		2.15	1.39	2.93	0.52	0.85	0.0	0.0	0.0	0.)
RCAF	8	7.94	7.94	9.52	7.94	9.52	0.0	0.0	0.0	0.)
USAF		15.87	15.87	15.87	13.61	15.87	0.0	0.0	0.0	0.) 1
LETTER		11.59	12.83	14.79	15.87	13.64	0.0	0.0	0.0	0.) 1
IDN 1		3.05	2.39	3.10	1.78	3.77	0.0	0.0	0.0	0.)
IDN 2		4.65	3.55	4.55	2.33	5.62	0.0	0.0	0.0	0.)
IDN 3		4.28	3.34	4.26	2.23	5.16	0.0	0.0	0.0	0.)
IDN 4		4.76	3.69	4.66	2.40	5.66	0.0	0.0	0.0	0.)
REC 1		3.27	3.27	3.45	1.53	3.31	0.0	0.0	0.0	0.)
REC 2		4.66	4.84	4.93	2.30	4.73	0.0	0.0	0.0	0.)
REC 3		4.35	4.48	4.62	2.03	4.41	0.0	0.0	0.0	0.)
REC 4		4.71	4.91	5.00	2.23	4.77	0.0	0.0	0.0	0.)
RCAF	9	4.76	4.76	6.80	4.76	6.80	0.0	0.0	0.0	0.)
USAF		7.94	9.52	9.52	9.52	9.52	0.0	0.0	0.0	0.)
LETTER		5.86	6.35	8.57	5.29	8.91	0.0	0.0	0.0	0.)
IDN 1		0.43	0.43	0.43	0.0	0.95	0.0	0.0	0.0	0.)
IDN 2		0.39	0.39	0.39	0.0	0.94	0.0	0.0	0.0	0.)
IDN 3		0.46	0.46	0.46	0.0	0.98	0.0	0.0	0.0	0.)
IDN 4		0.48	0.48	0.48	0.0	1.01	0.0	0.0	0.0	0.)
REC 1		0.44	0.54	1.28	0.0	0.46	0.0	0.0	0.0	0.)
REC 2		0.49	0.70	1.84	0.0	0.54	0.0	0.0	0.0	0.)
REC 3		0.50	0.67	1.76	0.0	0.53	0.0	0.0	0.0	0.)
REC 4		0.52	0.72	1.94	0.0	0.57	0.0	0.0	0.0	0.)
RCAF	10	11.91	9.52	11.91	9.52	11.91	0.0	0.0	0.0	0.) 1
USAF		15.87	15.87	15.87	15.87	15.87	0.0	0.0	0.0	0.) 1
LETTER		11.41	13.62	15.87	15.87	15.87	0.0	0.0	0.0	0.) 1
IDN 1		1.52	4.09	1.97	1.96	3.52	0.0	0.0	0.0	0.)
IDN 2		1.67	6.13	2.42	2.44	5.14	0.0	0.0	0.0	0.)
IDN 3		1.69	5.51	2.37	2.40	4.75	0.0	0.0	0.0	0.)
IDN 4		1.77	6.15	2.53	2.55	5.22	0.0	0.0	0.0	0.)
REC 1		3.80	3.77	3.80	3.17	3.80	0.0	0.0	0.0	0.)
REC 2		5.45	5.34	5.45	4.44	5.45	0.0	0.0	0.0	0.)
REC 3		5.05	5.00	5.05	4.18	5.05	0.0	0.0	0.0	0.)
REC 4		5.55	5.40	5.55	4.49	5.55	0.0	0.0	0.0	0.)

12.19	12	51.1102
17.46	17	18.9011
14.57	15	8.4188
2.21		3.9553
2.32		6.3188
2.44		5.3569
2.53		5.8684
2.21		6.6394
3.25		15.4212
3.07		13.4335
3.37		16.1742
5.89	6	2.1177
10.50	11	20.0995
8.68	9	15.7618
1.15		1.3765
1.26		2.4584
1.31		2.2481
1.37		2.5702
1.10		1.3677
1.54		3.4838
1.43		3.0018
1.57		3.8324
8.57	9	3.0242
15.42	15	4.1145
13.75	14	11.1009
2.82		2.3061
4.14		6.2742
3.85		4.9619
4.23		6.1479
2.96		2.6022
4.29		4.9893
3.98		4.7558
4.33		5.5225
5.58	6	4.9992
9.21	9	2.0161
7.00	7	10.7210
0.45		0.4568
0.42		0.4443
0.47		0.4856
0.49		0.5132
0.54		0.8628
0.71		1.8706
0.69		1.6840
0.75		2.0641
10.95	11	6.8044
15.87	16	0.0
14.53	15	15.9594
2.61		5.0380
3.56		15.2204
3.34		11.2023
3.64		14.7255
3.67		0.3154
5.23		0.7897
4.86		0.5860

RCAF 11	11.34	13.23	19.84	11.34	13.23	0.0	0.0	0.0	0.0	13
USAF	15.87	19.84	19.84	15.87	15.87	0.0	0.0	0.0	0.0	17
LETTER	13.25	12.55	18.78	14.72	19.40	0.0	0.0	0.0	0.0	15
IDN 1	1.51	1.18	2.43	0.69	2.42	0.0	0.0	0.0	0.0	1
IDN 2	1.65	1.29	2.94	0.69	3.09	0.0	0.0	0.0	0.0	1
IDN 3	1.62	1.26	2.81	0.69	2.91	0.0	0.0	0.0	0.0	1
IDN 4	1.65	1.30	2.94	0.69	3.09	0.0	0.0	0.0	0.0	1
REC 1	2.02	0.56	4.63	2.20	3.70	0.0	0.0	0.0	0.0	2
REC 2	3.07	0.76	6.72	3.34	5.38	0.0	0.0	0.0	0.0	[illegible]
REC 3	2.80	0.71	6.25	3.04	5.00	0.0	0.0	0.0	0.0	[illegible]
REC 4	3.07	0.77	6.70	3.34	5.38	0.0	0.0	0.0	0.0	[illegible]
RCAF 12	9.92	13.23	11.34	9.92	11.34	0.0	0.0	0.0	0.0	11
USAF	15.87	19.84	15.87	15.87	15.87	0.0	0.0	0.0	0.0	16
LETTER	16.43	20.46	21.65	16.06	20.22	0.0	0.0	0.0	0.0	18
IDN 1	2.38	2.37	3.97	1.89	2.57	0.0	0.0	0.0	0.0	2
IDN 2	2.83	2.77	5.73	2.03	3.58	0.0	0.0	0.0	0.0	3
IDN 3	2.78	2.74	5.22	2.06	3.39	0.0	0.0	0.0	0.0	3
IDN 4	2.92	2.88	5.78	2.14	3.76	0.0	0.0	0.0	0.0	3
REC 1	2.01	2.64	5.18	2.30	3.79	0.0	0.0	0.0	0.0	3
REC 2	3.13	4.17	7.90	3.61	5.83	0.0	0.0	0.0	0.0	4
REC 3	2.82	3.81	7.24	3.23	5.36	0.0	0.0	0.0	0.0	4
REC 4	3.14	4.31	7.96	3.59	5.93	0.0	0.0	0.0	0.0	4
RCAF 13	6.61	7.94	9.92	7.94	7.94	0.0	0.0	0.0	0.0	8
USAF	13.23	13.23	11.34	13.23	15.87	0.0	0.0	0.0	0.0	13
LETTER	11.82	13.78	12.89	11.07	14.04	0.0	0.0	0.0	0.0	12
IDN 1	1.98	1.90	2.63	0.65	1.06	0.0	0.0	0.0	0.0	1
IDN 2	2.50	2.09	3.08	0.61	1.14	0.0	0.0	0.0	0.0	1
IDN 3	2.48	2.11	2.99	0.72	1.20	0.0	0.0	0.0	0.0	1
IDN 4	2.66	2.20	3.15	0.75	1.27	0.0	0.0	0.0	0.0	2
REC 1	1.57	3.29	2.05	1.19	2.41	0.0	0.0	0.0	0.0	2
REC 2	2.34	5.21	3.26	1.56	3.81	0.0	0.0	0.0	0.0	3
REC 3	2.11	4.71	2.92	1.48	3.39	0.0	0.0	0.0	0.0	2
REC 4	2.29	5.28	3.27	1.57	3.79	0.0	0.0	0.0	0.0	3
RCAF 14	12.89	12.89	18.05	11.28	15.04	0.0	0.0	0.0	0.0	14
USAF	22.56	22.56	22.56	22.56	22.56	0.0	0.0	0.0	0.0	22
LETTER	22.13	22.81	21.36	19.91	24.59	0.0	0.0	0.0	0.0	22
IDN 1	6.89	4.77	4.90	3.72	3.72	0.0	0.0	0.0	0.0	4
IDN 2	7.65	5.13	5.18	3.86	3.85	0.0	0.0	0.0	0.0	5
IDN 3	7.52	5.10	5.17	3.87	3.86	0.0	0.0	0.0	0.0	5
IDN 4	7.89	5.27	5.33	3.97	3.96	0.0	0.0	0.0	0.0	5
REC 1	8.39	7.87	8.34	2.97	5.30	0.0	0.0	0.0	0.0	6
REC 2	13.31	12.46	13.48	4.38	7.87	0.0	0.0	0.0	0.0	10
REC 3	11.63	10.93	11.65	3.91	7.25	0.0	0.0	0.0	0.0	9
REC 4	13.37	12.52	13.48	4.27	8.11	0.0	0.0	0.0	0.0	10
RCAF 15	12.89	18.05	22.56	18.05	18.05	0.0	0.0	0.0	0.0	17
USAF	22.56	30.08	25.78	25.78	25.78	0.0	0.0	0.0	0.0	26
LETTER	23.40	24.77	24.83	25.37	24.83	0.0	0.0	0.0	0.0	24
IDN 1	3.17	3.99	4.00	3.99	6.57	0.0	0.0	0.0	0.0	4
IDN 2	3.33	4.52	4.54	4.52	8.95	0.0	0.0	0.0	0.0	5
IDN 3	3.38	4.44	4.42	4.41	8.30	0.0	0.0	0.0	0.0	4
IDN 4	3.49	4.64	4.64	4.63	9.10	0.0	0.0	0.0	0.0	5
REC 1	3.51	4.56	6.56	4.74	4.73	0.0	0.0	0.0	0.0	6
REC 2	5.03	6.89	9.49	7.18	7.17	0.0	0.0	0.0	0.0	7
REC 3	4.53	6.33	8.77	6.56	6.57	0.0	0.0	0.0	0.0	6
		7.06	9.73	7.33	7.35	0.0	0.0	0.0	0.0	7

13.80	14	49.2887
17.46	17	18.9011
15.74	16	40.0673
1.65		2.3786
1.93		4.3809
1.86		3.7912
1.93		4.3737
2.62		10.0131
3.85		21.0181
3.56		18.2671
3.85		20.8466
11.15	11	7.4112
16.67	17	12.6008
18.96	19	25.8609
2.64		2.4765
3.39		8.0494
3.24		5.7966
3.50		7.8175
3.18		6.8112
4.93		15.1749
4.49		13.1249
4.99		15.5565
8.07	8	5.6003
13.38	13	10.4578
12.72	13	6.4316
1.65		2.4694
1.88		4.0094
1.90		3.4523
2.01		3.8894
2.10		2.6214
3.24		7.8769
2.92		6.1594
3.24		8.1363
14.03	14	27.3176
22.56	23	0.0
22.16	22	12.0213
4.80		6.6922
5.14		9.5986
5.10		8.9069
5.29		10.2685
6.57		22.6815
10.30		64.7449
9.07		46.6350
10.35		65.5382
17.92	18	46.8619
[redacted].00	26	28.6194
24.64	25	2.1632
4.34		6.7082
5.18		18.9023
4.99		14.5507
5.30		19.0635
4.78		5.4041
7.15		10.0462
6.55		9.0742

RCAF	16	11.28	15.04	15.04	12.89	12.89	0.0	0.0	0.0	0.
USAF		18.05	22.56	25.78	22.56	25.78	0.0	0.0	0.0	0.
LETTER		17.36	20.25	15.88	15.82	20.60	0.0	0.0	0.0	0.
IDN 1		2.98	3.02	3.87	2.25	3.73	0.0	0.0	0.0	0.
IDN 2		3.28	3.22	4.53	2.29	4.49	0.0	0.0	0.0	0.
IDN 3		3.25	3.25	4.41	2.37	4.34	0.0	0.0	0.0	0.
IDN 4		3.39	3.38	4.68	2.43	4.60	0.0	0.0	0.0	0.
REC 1		4.25	5.97	5.82	2.26	4.26	0.0	0.0	0.0	0.
REC 2		6.25	8.32	8.18	3.25	6.27	0.0	0.0	0.0	0.
REC 3		5.78	7.79	7.66	2.93	5.80	0.0	0.0	0.0	0.
REC 4		6.38	8.47	8.36	3.18	6.40	0.0	0.0	0.0	0.
RCAF	17	12.89	12.89	12.89	12.89	12.89	0.0	0.0	0.0	0.
USAF		18.05	25.78	22.56	18.05	25.78	0.0	0.0	0.0	0.
LETTER		18.37	20.23	19.88	18.23	19.64	0.0	0.0	0.0	0.
IDN 1		2.16	3.83	3.78	1.73	2.20	0.0	0.0	0.0	0.
IDN 2		2.12	4.44	4.47	1.89	2.79	0.0	0.0	0.0	0.
IDN 3		2.24	4.31	4.28	1.95	2.46	0.0	0.0	0.0	0.
IDN 4		2.29	4.55	4.54	2.05	2.57	0.0	0.0	0.0	0.
REC 1		5.86	7.42	9.79	1.98	7.59	0.0	0.0	0.0	0.
REC 2		8.15	10.55	14.04	2.83	10.85	0.0	0.0	0.0	0.
REC 3		7.73	9.76	12.65	2.57	10.01	0.0	0.0	0.0	0.
REC 4		8.31	10.51	13.90	2.77	10.79	0.0	0.0	0.0	0.
RCAF	18	17.19	30.08	30.08	24.06	24.06	0.0	0.0	0.0	0.
USAF		24.06	34.38	34.38	30.08	30.08	0.0	0.0	0.0	0.
LETTER		27.28	28.03	31.85	27.23	30.60	0.0	0.0	0.0	0.
IDN 1		3.10	1.42	4.61	0.76	1.84	0.0	0.0	0.0	0.
IDN 2		4.01	1.57	7.34	0.90	2.20	0.0	0.0	0.0	0.
IDN 3		3.81	1.55	6.60	0.85	2.11	0.0	0.0	0.0	0.
IDN 4		4.02	1.57	7.34	0.90	2.20	0.0	0.0	0.0	0.
REC 1		6.47	3.79	5.50	3.52	7.08	0.0	0.0	0.0	0.
REC 2		9.77	5.96	8.44	5.45	11.07	0.0	0.0	0.0	0.
REC 3		8.98	5.38	7.70	4.95	9.97	0.0	0.0	0.0	0.
REC 4		9.80	5.97	8.47	5.46	11.10	0.0	0.0	0.0	0.
RCAF	19	17.19	20.05	30.08	17.19	20.05	0.0	0.0	0.0	0.
USAF		24.06	34.38	40.11	34.38	34.38	0.0	0.0	0.0	0.
LETTER		25.77	23.45	29.36	27.28	26.27	0.0	0.0	0.0	0.
IDN 1		1.90	0.55	1.78	1.11	1.14	0.0	0.0	0.0	0.
IDN 2		2.14	0.57	1.95	1.17	1.19	0.0	0.0	0.0	0.
IDN 3		2.16	0.56	1.99	1.22	1.25	0.0	0.0	0.0	0.
IDN 4		2.27	0.54	2.09	1.29	1.32	0.0	0.0	0.0	0.
REC 1		4.42	6.92	5.87	1.90	4.70	0.0	0.0	0.0	0.
REC 2		6.87	11.03	9.13	2.44	7.28	0.0	0.0	0.0	0.
REC 3		6.30	9.86	8.33	2.28	6.66	0.0	0.0	0.0	0.
REC 4		6.98	11.14	9.25	2.45	7.37	0.0	0.0	0.0	0.
RCAF	20	10.03	10.03	12.03	8.59	12.03	0.0	0.0	0.0	0.
USAF		17.19	17.19	20.05	15.04	17.19	0.0	0.0	0.0	0.
LETTER		13.39	13.51	15.68	13.37	13.93	0.0	0.0	0.0	0.
IDN 1		1.49	0.0	1.94	0.0	0.0	0.0	0.0	0.0	0.
IDN 2		1.44	0.0	1.76	0.0	0.0	0.0	0.0	0.0	0.
IDN 3		1.59	0.0	1.94	0.0	0.0	0.0	0.0	0.0	0.
IDN 4		1.65	0.0	1.95	0.0	0.0	0.0	0.0	0.0	0.
REC 1		0.67	0.0	0.86	0.0	0.0	0.0	0.0	0.0	0.
REC 2		0.68	0.0	0.88	0.0	0.0	0.0	0.0	0.0	0.
REC 3		0.78	0.0	0.95	0.0	0.0	0.0	0.0	0.0	0.

13.43	13	10.3861
22.95	23	40.3809
17.98	18	21.4294
3.17		1.7063
3.56		3.6170
3.52		2.9282
3.69		3.5829
4.51		9.0357
6.45		16.7794
5.99		15.5059
6.56		18.4075

12.89	13	0.0000
22.04	22	60.1560
19.27	19	3.3129
2.74		3.9223
3.14		6.1958
3.05		5.3384
3.20		6.1861
6.53		33.7185
9.28		69.6072
8.54		56.9360
9.26		68.4942

25.09	25	114.3296
30.59	31	71.7885
29.00	29	17.6779
2.34		9.3221
3.20		26.7411
2.99		21.1353
3.20		26.7668
5.27		10.0044
8.14		23.3021
7.39		19.2435
8.16		23.5280

20.91	21	113.2464
33.46	33	134.9766
26.43	26	18.6512
1.29		1.2124
1.41		1.6340
1.44		1.6796
1.50		1.9338
4.76		14.2086
7.35		41.0585
6.69		32.3594
7.44		42.1022

10.54	11	8.7643
17.33	17	12.7197
13.98	14	3.8427
0.69		3.6231
0.64		3.1388
0.71		3.7896
0.72		3.9190
0.31		0.7160
0.31		0.7506
0.35		0.9136
0.36		0.9990

RCAF 21	11.28	9.02	18.05	7.52	12.89	0.0	0.0	0.0	0.0	11.75
USAF	18.05	15.04	18.05	15.04	18.05	0.0	0.0	0.0	0.0	16.84
LETTER	11.38	11.23	14.28	10.94	15.11	0.0	0.0	0.0	0.0	12.59
IDN 1	2.21	1.36	1.08	-0.02	3.10	0.0	0.0	0.0	0.0	1.55
IDN 2	2.39	1.60	1.05	-0.02	3.51	0.0	0.0	0.0	0.0	1.71
IDN 3	2.39	1.49	1.12	-0.02	3.45	0.0	0.0	0.0	0.0	1.68
IDN 4	2.47	1.52	1.15	-0.02	3.59	0.0	0.0	0.0	0.0	1.74
REC 1	4.62	6.75	2.11	-0.08	3.59	0.0	0.0	0.0	0.0	3.40
REC 2	6.70	10.03	2.86	-0.08	5.27	0.0	0.0	0.0	0.0	4.96
REC 3	6.20	9.19	2.63	-0.08	4.96	0.0	0.0	0.0	0.0	4.58
REC 4	6.78	10.00	2.82	-0.08	5.38	0.0	0.0	0.0	0.0	4.98
RCAF 22	9.02	9.02	12.89	9.02	11.28	0.0	0.0	0.0	0.0	10.25
USAF	15.04	18.05	18.05	15.04	18.05	0.0	0.0	0.0	0.0	16.84
LETTER	11.21	14.14	11.85	10.34	12.70	0.0	0.0	0.0	0.0	12.05
IDN 1	0.0	0.0	1.60	0.0	-0.00	0.0	0.0	0.0	0.0	0.32
IDN 2	0.0	0.0	1.62	0.0	-0.00	0.0	0.0	0.0	0.0	0.32
IDN 3	0.0	0.0	1.69	0.0	-0.00	0.0	0.0	0.0	0.0	0.34
IDN 4	0.0	0.0	1.75	0.0	-0.00	0.0	0.0	0.0	0.0	0.35
REC 1	-0.05	0.63	1.09	-0.05	-0.17	0.0	0.0	0.0	0.0	0.29
REC 2	-0.04	0.72	1.27	-0.04	-0.17	0.0	0.0	0.0	0.0	0.35
REC 3	-0.04	0.69	1.25	-0.04	-0.17	0.0	0.0	0.0	0.0	0.34
REC 4	-0.04	0.70	1.31	-0.04	-0.17	0.0	0.0	0.0	0.0	0.35
RCAF 23	11.28	11.28	12.89	9.02	11.28	0.0	0.0	0.0	0.0	11.15
USAF	15.04	18.05	18.05	15.04	15.04	0.0	0.0	0.0	0.0	16.24
LETTER	13.28	16.72	16.36	11.42	18.22	0.0	0.0	0.0	0.0	15.20
IDN 1	-0.04	0.98	3.37	0.0	1.32	0.0	0.0	0.0	0.0	1.13
IDN 2	-0.04	1.14	3.89	0.0	1.40	0.0	0.0	0.0	0.0	1.28
IDN 3	-0.04	1.07	3.82	0.0	1.44	0.0	0.0	0.0	0.0	1.26
IDN 4	-0.04	1.08	4.01	0.0	1.52	0.0	0.0	0.0	0.0	1.31
REC 1	0.44	3.86	5.26	0.78	2.83	0.0	0.0	0.0	0.0	2.64
REC 2	0.44	5.66	7.75	0.89	4.40	0.0	0.0	0.0	0.0	3.83
REC 3	0.44	5.15	7.22	0.86	4.03	0.0	0.0	0.0	0.0	3.54
REC 4	0.42	5.49	7.83	0.87	4.49	0.0	0.0	0.0	0.0	3.82
RCAF 24	7.52	11.28	12.89	6.45	9.02	0.0	0.0	0.0	0.0	9.43
USAF	12.89	18.05	22.56	12.89	15.04	0.0	0.0	0.0	0.0	16.29
LETTER	11.55	12.62	14.30	11.02	15.11	0.0	0.0	0.0	0.0	12.92
IDN 1	0.0	0.0	2.69	0.0	1.43	0.0	0.0	0.0	0.0	0.82
IDN 2	0.0	0.0	2.87	0.0	1.49	0.0	0.0	0.0	0.0	0.87
IDN 3	0.0	0.0	2.89	0.0	1.54	0.0	0.0	0.0	0.0	0.89
IDN 4	0.0	0.0	2.97	0.0	1.61	0.0	0.0	0.0	0.0	0.92
REC 1	0.39	6.46	8.16	0.0	2.20	0.0	0.0	0.0	0.0	3.44
REC 2	0.38	9.51	12.16	0.0	3.11	0.0	0.0	0.0	0.0	5.03
REC 3	0.39	8.82	11.09	0.0	2.82	0.0	0.0	0.0	0.0	4.62
REC 4	0.37	9.54	12.15	0.0	3.06	0.0	0.0	0.0	0.0	5.02
RCAF 25	9.02	9.02	12.89	9.02	12.89	0.0	0.0	0.0	0.0	10.57
USAF	15.04	15.04	18.05	12.89	18.05	0.0	0.0	0.0	0.0	15.81
LETTER	12.68	11.92	13.94	10.86	14.17	0.0	0.0	0.0	0.0	12.71
IDN 1	2.32	0.99	2.32	0.0	0.99	0.0	0.0	0.0	0.0	1.32
IDN 2	2.41	1.04	2.40	0.0	1.04	0.0	0.0	0.0	0.0	1.38
IDN 3	2.42	0.99	2.41	0.0	0.99	0.0	0.0	0.0	0.0	1.36
IDN 4	2.48	1.00	2.47	0.0	1.00	0.0	0.0	0.0	0.0	1.39
REC 1	4.06	1.79	3.56	0.38	1.94	0.0	0.0	0.0	0.0	2.35
REC 2	6.21	2.64	5.36	0.36	2.86	0.0	0.0	0.0	0.0	3.49
REC 3	5.68	2.39	4.95	0.37	2.58	0.0	0.0	0.0	0.0	3.19
REC 4	6.20	2.57	5.45	0.36	2.78	0.0	0.0	0.0	0.0	3.49

11.75	12	66.5076
16.84	17	10.8569
12.59	13	15.2601
1.55		5.5677
1.71		7.1682
1.68		6.8687
1.74		7.4731
3.40		26.5252
4.96		58.6592
4.58		49.5072
4.98		58.8736
10.25	10	12.5464
16.84	17	10.8569
12.05	12	8.4452
0.32		2.0376
0.32		2.0896
0.34		2.2879
0.35		2.4388
0.29		1.1919
0.35		1.5664
0.34		1.5164
0.35		1.6359
11.15	11	7.6026
16.24	16	10.8569
15.20	15	30.7815
1.13		7.7099
1.28		10.2098
1.26		9.8882
1.31		10.9375
2.64		16.7141
3.83		39.2016
3.54		33.1871
3.82		39.5781
9.43	9	28.1208
16.29	16	67.0616
12.92	13	12.3042
0.82		5.8875
0.87		6.6607
0.89		6.8160
0.92		7.2304
3.44		54.0353
5.03		121.5302
4.62		101.9504
5.02		121.9152
10.57	11	17.9471
15.81	16	19.7196
12.71	13	7.6596
1.32		3.9725
1.38		4.2450
1.36		4.3548
1.39		4.6050
2.35		8.7334
3.49		21.7859
3.19		19.2389
3.49		22.7869

RCAF	26	9.02	9.02	12.89	7.52	9.02	0.0	0.0	0.0	0.0
USAF		15.04	18.05	18.05	15.04	15.04	0.0	0.0	0.0	0.0
LETTER		14.44	15.50	16.24	11.05	16.06	0.0	0.0	0.0	0.0
IDN 1		0.86	2.14	3.10	0.0	2.17	0.0	0.0	0.0	0.0
IDN 2		0.88	2.25	3.42	0.0	2.28	0.0	0.0	0.0	0.0
IDN 3		0.93	2.25	3.36	0.0	2.28	0.0	0.0	0.0	0.0
IDN 4		0.96	2.32	3.48	0.0	2.35	0.0	0.0	0.0	0.0
REC 1		1.84	3.77	6.36	0.38	2.98	0.0	0.0	0.0	0.0
REC 2		2.55	5.75	9.30	0.37	4.42	0.0	0.0	0.0	0.0
REC 3		2.33	5.27	8.67	0.37	4.09	0.0	0.0	0.0	0.0
REC 4		2.52	5.81	9.37	0.36	4.49	0.0	0.0	0.0	0.0
RCAF	27	7.02	7.02	11.70	7.02	11.70	0.0	0.0	0.0	0.0
USAF		14.04	17.55	17.55	14.04	17.55	0.0	0.0	0.0	0.0
LETTER		13.31	10.35	14.06	9.95	15.77	0.0	0.0	0.0	0.0
IDN 1		0.67	1.34	2.84	0.47	2.18	0.0	0.0	0.0	0.0
IDN 2		0.66	1.53	3.37	0.45	2.42	0.0	0.0	0.0	0.0
IDN 3		0.71	1.44	3.29	0.49	2.40	0.0	0.0	0.0	0.0
IDN 4		0.72	1.48	3.43	0.50	2.47	0.0	0.0	0.0	0.0
REC 1		1.31	3.89	3.90	0.72	4.32	0.0	0.0	0.0	0.0
REC 2		1.69	5.65	5.73	0.75	5.96	0.0	0.0	0.0	0.0
REC 3		1.60	5.28	5.34	0.77	5.71	0.0	0.0	0.0	0.0
REC 4		1.70	5.68	5.77	0.78	6.04	0.0	0.0	0.0	0.0
RCAF	28	10.03	11.70	17.55	14.04	14.04	0.0	0.0	0.0	0.0
USAF		14.04	17.55	23.39	17.55	23.39	0.0	0.0	0.0	0.0
LETTER		14.68	10.95	15.44	13.29	15.87	0.0	0.0	0.0	0.0
IDN 1		2.64	1.54	2.09	0.0	2.74	0.0	0.0	0.0	0.0
IDN 2		3.48	1.71	2.49	0.0	3.51	0.0	0.0	0.0	0.0
IDN 3		3.35	1.70	2.42	0.0	3.36	0.0	0.0	0.0	0.0
IDN 4		3.57	1.77	2.54	0.0	3.58	0.0	0.0	0.0	0.0
REC 1		2.42	2.26	5.39	0.0	3.40	0.0	0.0	0.0	0.0
REC 2		3.46	3.27	8.10	0.0	4.97	0.0	0.0	0.0	0.0
REC 3		3.33	3.12	7.50	0.0	4.67	0.0	0.0	0.0	0.0
REC 4		3.61	3.38	8.17	0.0	5.04	0.0	0.0	0.0	0.0
RCAF	29	6.80	5.95	11.91	4.76	9.52	0.0	0.0	0.0	0.0
USAF		11.91	13.61	13.61	9.52	15.87	0.0	0.0	0.0	0.0
LETTER		10.36	8.87	12.44	8.99	12.15	0.0	0.0	0.0	0.0
IDN 1		1.37	1.00	0.90	1.02	1.36	0.0	0.0	0.0	0.0
IDN 2		1.55	1.09	0.89	1.10	1.55	0.0	0.0	0.0	0.0
IDN 3		1.60	1.13	0.98	1.15	1.59	0.0	0.0	0.0	0.0
IDN 4		1.69	1.20	1.03	1.21	1.69	0.0	0.0	0.0	0.0
REC 1		1.32	0.91	2.58	1.51	1.95	0.0	0.0	0.0	0.0
REC 2		1.99	1.39	3.76	2.28	2.88	0.0	0.0	0.0	0.0
REC 3		1.88	1.24	3.50	2.12	2.70	0.0	0.0	0.0	0.0
REC 4		2.11	1.37	3.84	2.36	2.98	0.0	0.0	0.0	0.0
RCAF	30	9.52	9.52	11.91	9.52	7.94	0.0	0.0	0.0	0.0
USAF		13.61	13.61	15.87	13.61	13.61	0.0	0.0	0.0	0.0
LETTER		12.02	11.77	13.00	9.63	12.91	0.0	0.0	0.0	0.0
IDN 1		0.92	3.25	8.61	1.07	2.95	0.0	0.0	0.0	0.0
IDN 2		0.90	4.75	13.32	1.15	4.38	0.0	0.0	0.0	0.0
IDN 3		1.00	4.54	12.15	1.20	4.07	0.0	0.0	0.0	0.0
IDN 4		1.05	5.01	13.55	1.26	4.52	0.0	0.0	0.0	0.0
REC 1		2.04	1.71	3.98	2.09	5.13	0.0	0.0	0.0	0.0
REC 2		3.06	2.65	6.11	3.12	8.02	0.0	0.0	0.0	0.0
REC 3		2.85	2.45	5.48	2.89	7.01	0.0	0.0	0.0	0.0
			2.76	6.13	3.19	8.02	0.0	0.0	0.0	0.0

9.50	9	16.1007
16.24	16	10.8569
14.66	15	18.2540
1.65		5.9652
1.77		7.1448
1.76		6.8671
1.82		7.3231
3.07		20.0482
4.47		45.4884
4.15		39.2695
4.51		46.5454
8.89	9	26.2710
16.14	16	14.7774
12.69	13	24.7884
1.50		4.0197
1.69		5.9786
1.67		5.5198
1.72		6.0300
2.83		11.2634
3.96		25.4320
3.74		22.2337
3.99		25.7810
13.47	13	32.2579
19.18	19	67.3194
14.05	14	15.8575
1.80		4.9849
2.24		8.5307
2.16		7.7856
2.29		8.8786
2.70		15.3109
3.96		34.5512
3.72		29.5271
4.04		35.0342
7.79	8	33.4666
12.90	13	22.2288
10.56	11	11.4385
1.13		0.1917
1.24		0.3573
1.29		0.3228
1.36		0.3704
1.65		1.6341
2.46		3.2870
2.29		2.9285
2.53		3.4759
9.68	10	8.0645
14.06	14	4.1145
11.86	12	7.4176
7.36		38.9806
4.90		101.1992
4.59		81.7669
5.08		102.9682
2.99		8.9044
4.59		22.3323
4.14		16.1604

CURVE 4312	-3.304	0.560	-0.011	0.589	1.226	0.5397	26.225	14	73.78	3
LINE	0.033	0.151		0.693	1.259	0.5397			48	
CURVE 1322	-3.743	0.603	-0.010	0.773	1.078	0.7501	18.261	14	90.92	5
LINE	-0.750	0.236		0.887	1.109	0.7501			48	
CURVE 2322	-5.255	0.842	-0.013	0.790	1.593	0.7666	39.509	14	134.14	34
LINE	-1.351	0.363		0.866	1.623	0.7666			48	
CURVE 3322	-4.913	0.790	-0.013	0.797	1.430	0.7681	31.720	14	123.68	50
LINE	-1.157	0.329		0.893	1.465	0.7681			48	
CURVE 4322	-5.308	0.851	-0.013	0.792	1.586	0.7705	39.149	14	135.69	58
LINE	-1.355	0.367		0.873	1.618	0.7705			48	

ERROR - A SPECIFICATION INTERRUPT HAS OCCURRED IN SUB-PROGRAM MAIN
- AT ADDRESS 0099B3 RELATIVE TO THE ENTRY POINT OF MAIN
- THE RETURN REGISTER INDICATES THE LAST CALL WAS MADE FROM ADDRESS 00190C RELATIVE TO THE ENTRY POINT OF MAIN
- THE LINKAGE REGISTER INDICATES THE LAST CALL WAS MADE TO SUB-PROGRAM EXIT

•	8509.	165139.	3477553.	15.9224 11.4719
5	354.3474	1645.7617	32256.7500	15.9224
•	8509.	165139.	3477553.	12.6206
34	778.8882	2440.6025	48086.3984	15.9224
•	8509.	165139.	3477553.	28.7370
20	656.3757	2245.4587	44153.9570	15.9224
•	8509.	165139.	3477553.	24.1516
68	794.2315	2467.8489	48613.9492	15.9224
..	8509.	165139.	3477553.	29.2548